

Municipal Journal

Volume XXXVI

NEW YORK, MARCH 19, 1914.

No. 12

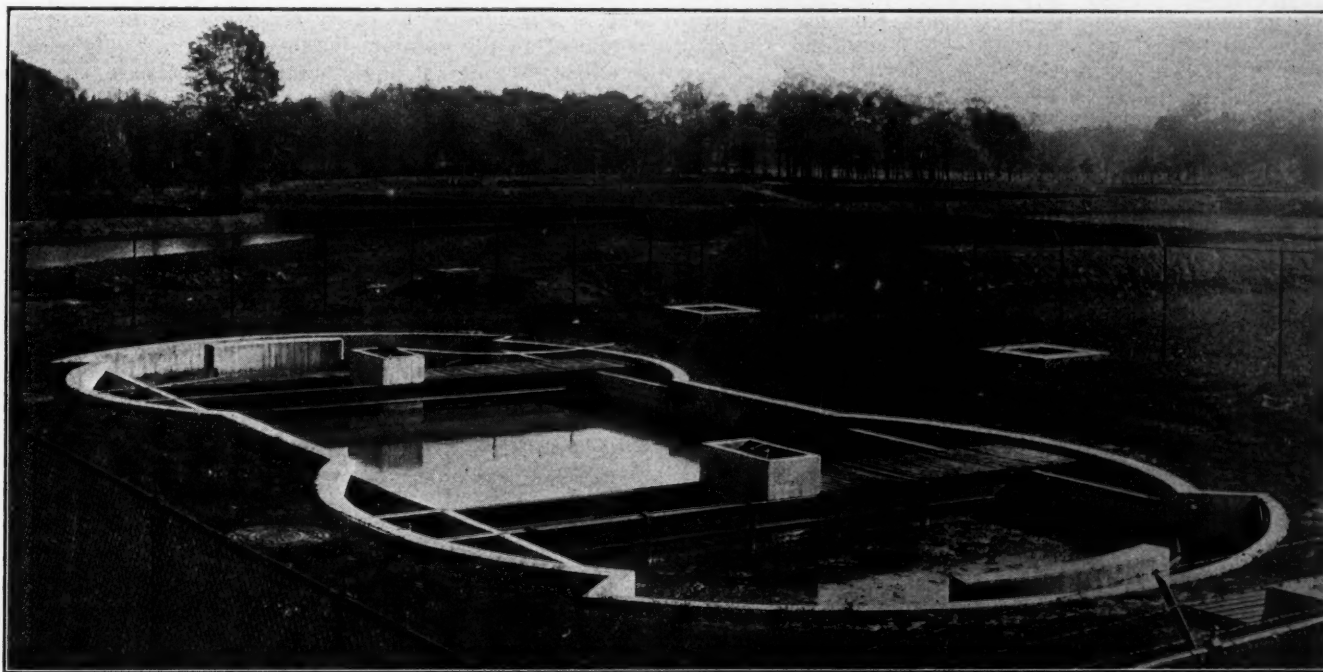


FIG. 1. IMHOFF TANKS. SCUM FORMING IN FOREGROUND OR ENTRANCE END. Since this picture was taken a longitudinal bridge has been built, the slopes have been cleaned and the scum has entirely disappeared.

OPERATION OF SEWAGE DISPOSAL PLANTS

Emscher Tanks—Principles of Operation and Design—Baffles and Scum Boards—Gas Vents and Scum—Cleaning Slopes and Slots—Drawing Off Sludge—Sludge Beds and Sludge Disposal.

By FRANCIS E. DANIELS, A. M.*

PART II—TANKS. (Continued from page 240.)

We now come to the much talked of Emscher or Imhoff tank. This form is certainly a decided improvement on the previous types of apparatus for the preliminary treatment of sewage; but while it has many good features and advantages it must be borne in mind that it is an apparatus for preliminary treatment only and not a complete "system" of sewage disposal. In many cases the effluent from an Imhoff tank would be quite good enough to be discharged into the stream; in others, however, further treatment of the effluent is needed either for the prevention of nuisance or for the elimination of bacteria. In addition to the patent fee attached, Imhoff tanks are usually more costly to build than those of simpler design. Furthermore, they require such careful management and frequent attention that, in the opinion of the writer, in small installations or in out-of-the-way locations, where frequent attention may be lacking, they had better be omitted and one of the simpler forms of apparatus used.

Notwithstanding the above limitations, however, the

principles of the Imhoff tank are good, and the practical results of the process are excellent. Briefly, the first purpose of the apparatus is to clarify the sewage by sedimentation without allowing the liquids to become foul, and the second is to digest the solids thoroughly so that they may be disposed of as easily as possible, and without offense. The former is accomplished by allowing the sewage to flow through an upper story or compartment, whose base consists of steep slopes so arranged as to form an inclined slot in the bottom so that the settling solids may slide through into a lower story or sludge digesting chamber, while gases liberated from the decomposing sludge cannot reach the fresh flowing sewage in the upper compartment because as the bubbles rise they will be deflected to one side by the projecting slopes and pass out of gas vents arranged for the purpose. The latter aim of the tank is brought about by holding the solids in the lower compartment until properly digested and ripened. By means of the appropriate deep design with steep bottom slopes the properly digested sludge may be drawn out from the bottom of the pile at frequent intervals without disturbing the half-digested or fresh materials in the layers above.

*Director of Water and Sewerage Inspection, Bureau of Food, Drugs, Water and Sewerage, New Jersey Board of Health.

The upper compartment should be so adjusted and proportioned that the sewage is held therein for a comparatively short time, say, two to three hours or less. In this period, practically all of the suspended solids capable of settling within a reasonable time will be deposited; but if the sewage is held for a longer time there is danger of putrefaction beginning in the liquids with but little or no additional clarification. Fresh sewage, therefore, entering an Imhoff tank should pass through and emerge in an inoffensive condition.

This important point should always be borne in mind by the plant attendant. The bubbling of gases or the belching up of solids within the flow chamber is a sure sign that something is wrong; but he should not wait for such indications, because some damage may be done before these things become apparent. Materials lodged upon the slopes, generate gases, some of which are dissolved in the liquids and some are trapped under the solids until the pressure is sufficient to cause an upheaval. This results in the contamination of the flowing liquid by both gases and solids and defeats one of the fundamental purposes of Imhoff tanks. The attendant should see that the slopes are kept clean and that the slots are not obstructed. The slopes should be built with surfaces as smooth as practicable, and as steep as possible consistent with other requirements, so that the lodgment of solids will be a minimum. The slots would be quite wide, say, about 10 inches, but they should be well overlapped. Footways should be provided so that the attendant can easily reach all parts of the slopes to clean them down with a long-handled squeegee and to push entirely through the slots any solids which have accumulated on the slopes. This cleaning of slopes by the attendant should be done frequently, say every day or two, depending upon local conditions; but care must be exercised not to agitate the flow chamber or else more harm than good may result. Unless the squeegee is manipulated cautiously some of the finely divided matters will not be pushed through the slot but will be stirred up by the swirling liquids, and then either deposited back where they were or carried out in the tank effluent. A piece of galvanized iron pipe makes a smooth handle for the squeegee and its weight helps to hold down the tool against the buoyancy of the water. It can also be bent into convenient shapes if desired.

To check uneven distribution of flow, baffles are often placed in tanks so as to allow the suspended solids a better chance to settle out, but care must be exercised in the design and arrangement of these or else more harm than good will result. A deep scum board or baffle is likely to cause a rapid current under it which results in stirring things up and retarding sedimentation. Another disadvantage of deep baffles is that they often cause uneven deposits which cover over slots very quickly.

After all, it is very questionable whether baffles are needed or even advisable. The writer has already advised the removal of baffles from one set of Imhoff tanks in the hope of correcting some of the troubles referred to above.

The attendant, however, should not make any structural change in his tanks until he has made careful tests and records of conditions and results so that he may be in a position to know whether the change is beneficial or not. If possible, changes should be made only with the advice and consent of the designing engineer. Every plant should be operated so as to carry out the purpose of the design unless there is good reason for doing otherwise.

Shallow scum-boards may be of service in catching light materials on fresh sewage. These floating substances the attendant should skim off and dump over into

the gas vents, as no decomposition should be permitted within the flow chamber.

In designing Imhoff tanks the plan and arrangement of the gas vents should receive careful consideration. Unless the sewage is very carefully screened before entering the tank, the gases liberated by the decomposing sludge will bring up with them considerable quantities of solid matters. These will form a thick stratum in traps or pockets under slope walls and in all the vents unless the gases are released therefrom. Therefore, all slope walls should be brought up well above the flow line in such a manner that there are no traps or pockets and in positions to be easily accessible to the plant attendant. In the opinion of the writer, the solids within a mass of scum strongly charged with gases cannot decompose so readily or properly as they would if the gases were removed and the solids allowed to sink to the bottom. Furthermore, the accumulated trapped gases take up valuable space by displacement, and should they for any cause be suddenly set free there is greater danger of unpleasantness. Some of the gases liberated from a mass of decomposing scum are quite offensive and others, such as marsh gas, hydrogen, and hydrogen sulphide, burn, and when mixed with the right proportion of air are quite explosive. While there is no danger in this regard in open tanks, care should always be exercised in entering unventilated closed sewage tanks of whatever type. (The same caution applies to unventilated sewers or manholes, and illuminating gas sometimes leaks into the sewerage system and causes explosions.)

The attendant must, therefore, give frequent attention to the gas vents to keep the scum down and the gases liberated. In the absence of a better scheme, the writer has used a pole with a short piece of board nailed across the end and manipulated in the manner of the old-fashioned churn dasher. By this means a scum over eight feet thick was completely disintegrated and caused to settle in a short time. If a good water pressure is available, a series of jets may be arranged or a hand hose used to play upon the surface of the liquids in the gas vents to keep down scum formation. In this case daily attention is required right from the start, as the method will not be effective if at any time a heavy scum is allowed to form.

If the distributing inlet channel to a single Imhoff tank or battery of such tanks is large and deep, heavy deposits occur in it, and if these are not frequently removed decomposition sets in and the flow is unnecessarily contaminated; also when the flow is reversed (which should be done frequently to allow a more even deposit of solids), some of this material will be washed out in the effluent.

Several of the features above mentioned are well illustrated by the writer's experiences with the Imhoff tanks in New Jersey. At one place the manholes were inadequate to allow of proper attention and after some months it was decided to remove the entire concrete cover. This was done and the eight feet of scum which had accumulated was churned down, as before mentioned, by pushing down the "dasher" through the mass to make a gas vent and then breaking up the scum from the bottom. A very little attention now prevents its reappearance. It was then found advisable to build up the vent walls to prevent the flooding and mixing of the contents of both flow and sludge compartments during heavy sewage discharge at times of showers. The tank has also large distributing inlet channels which collect a considerable deposit. There being no provision for draining the deposit into the sedimentation chamber, cleaning has to be done by bailing the material over the inlet weir while the sewage is flowing in; for if

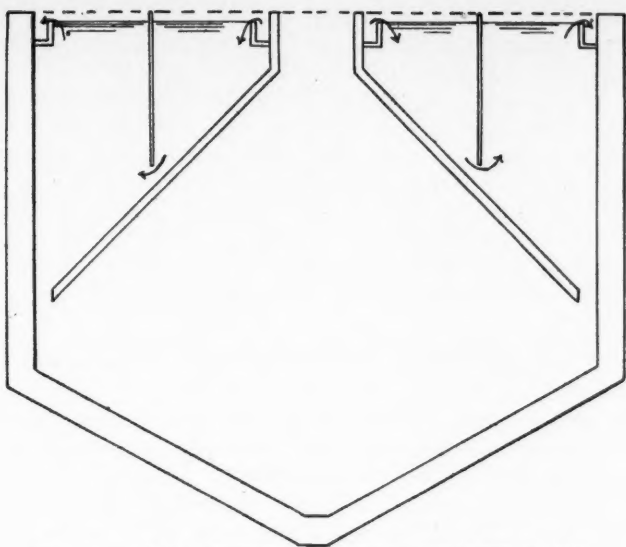


FIG. 2. PLAN SUBMITTED FOR IMHOFF TANK.

this is not done before the flow is reversed the accumulated solids are washed into the contact beds. The installation now, with only a very little daily attention from the careful man in charge, is giving excellent results.

At another plant, after a short run the tank had about four feet of scum in the gas vents, which was churned down as in the case just described. Considerable grease and soapy materials in rounded masses remained floating, and if they do not eventually sink they may have to be removed by skimming. The attendant states, however, that even these particles do disintegrate and sink. Certainly the layer does not increase in thickness, although no material has been removed. A scum was beginning to form on the flow chambers, and upon testing the slopes the slots were found covered over with a very deep decomposing mass of settled solids, the slightest disturbance of which caused a violent ebullition of gases and an upheaval of solids charged with bubbles. After having a longitudinal bridge built across the tank to make the slopes accessible, instructions were given to push the solids through the slots and keep the slopes clean by frequent attention. At the next visit of the writer there was still some deposit on the slopes; but no doubt this was because the tool did not fit the slots so as to shove all of the solids clear through into the lower compartment. At the present writing the tank is in fine condition, and only a little attention is needed every other day. The flow chamber is now free from scum and only a thin layer floats in the gas vents.

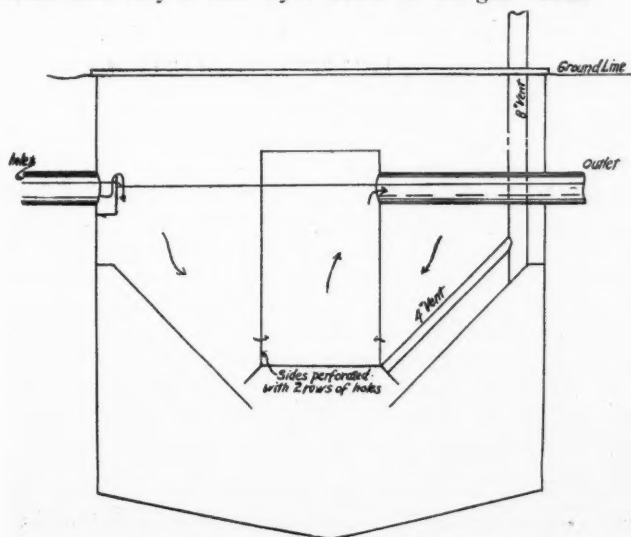


FIG. 3. PLAN SUBMITTED FOR IMHOFF TANK.

Figures 2 and 3 are tracings showing the slope arrangement of two-story tanks from two sets of sewage disposal plans on file. Fig. 2 is a section through a circular tank, 30 feet in diameter. The flow is outward, as indicated. In this the central gas vent is good but no bridge is shown to make the vent easily accessible. Unless little things like these are provided for in the beginning, the operation is likely to be neglected, and this type of tank should receive proper attention from the very start. There may have been some particular reason which led the designing engineer in this case to allow the straight vertical connection between lower and upper stories. The writer would have preferred to have avoided the upward passage of gases by one of the standard methods, such as a contraction of the lower chamber, a fillet-like thickening of lower wall, or another slope with extra gas vent. In a tank of this design it would seem that the greatest deposit of solids will be in a ring near the wall and not at the center where the sludge outlet pipe is located.

In Figure 3 we have a section of a circular two-story tank, 15 feet in diameter. This tank is covered and is almost wholly inaccessible. The flow enters at one side into a trough extending around the tank and over a circular weir, radially toward the center and out by way of a central cylinder, as indicated. The central cylinder is to receive also a disinfectant. It will be no-

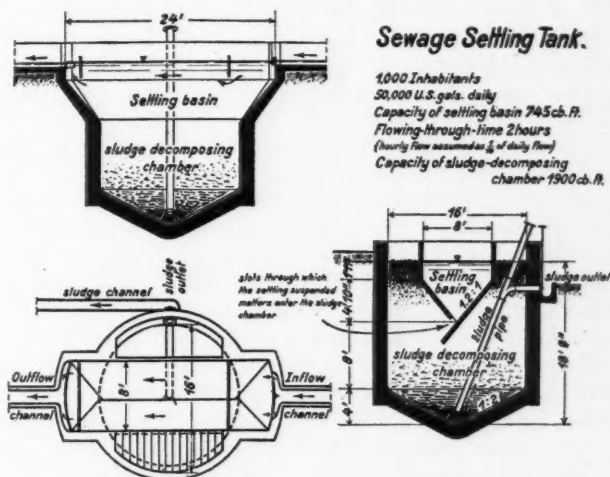


FIG. 4. APPROVED PLAN FOR IMHOFF TANK.

ticed that there are two scum traps or pockets, one under the central cylinder and one under the main circular slope. There are four 8-inch gas vents to the larger pocket and two 4-inch vents to the smaller pocket. The writer believes these pockets will fill up with scum, which may interfere with free passage of gas through the slots.

This plant was built square instead of round, was covered with a concrete roof, and the 8-inch vents were brought together under the cover and connected to a central ventilator. There is now no way of determining what is going on in the lower chamber, not even by sounding down a vent pipe. A heavy scum forms in the upper compartment and when cleaning is done the sewage has to be by-passed and the entire contents of both upper and lower chambers pumped out from below. On account of the heavy deposits accumulating in it, the inlet channel was removed entirely. Recently the tank was cleaned out by the attendant, but little can be learned of the actual conditions within. At present a new scum is forming upon the sewage in the upper compartment and the slot is covered over with a deep mass of solids which cannot be pushed through because the slopes are inaccessible.

Although this plant gives under the present conditions

a very fair effluent, it would appear that the real purpose of the two-story design has been defeated.

In another horizontal flow Imhoff tank the central slopes were brought together like a sharp gable roof with only two chimney-like vents. The writer believes it would have been better to have opened up the slopes the whole length after the style shown in Fig. 4, so as to avoid the scum trap.

The sludge in an Imhoff tank should remain in its chamber until it has become thoroughly decomposed and transformed into a black humus-like mass. The process will take some time, possibly several months, depending upon local conditions; but as the older sludge becomes ripened it should be withdrawn to make room for the newer deposits. This will require some care and good judgment on the part of the attendant. He must learn by experience when to draw and how much to let out at a time, and every plant may have to have a slightly different routine. Sounding with an iron plate on a wire or some other convenient method may be used to determine the depth and rate of deposit. If sufficient storage capacity has been provided, the top of the deposit should not be allowed to reach nearer the slots than about two feet for fear of the denser strata overlying the sludge extending into the upper chamber and the possible diffusion of decomposition products. The sludge should be withdrawn at frequent intervals and only so much let out as can be conveniently handled on the drying bed, or until there is the slightest indication that only partly decomposed materials are beginning to flow out. The drawing should be done slowly and carefully so as to allow the sludge to settle evenly and not cause a breaking through of fresher materials into the inlet end of the sludge pipe. The attendant will have to learn the difference between good and bad sludge. Good sludge should be dark in color, more or less granular and not sticky or pasty, should not have offensive odor, should be somewhat frothy and a good deal like black garden soil mixed with water. If a pailful be poured out and the pail put in an inclined position, what was in contact with the surfaces of the pail will separate and clear streaks will appear upon the metallic surfaces. Bad sludge is only partly decomposed, is usually lighter in color, has offensive odor, does not dry rapidly, and is somewhat sticky or pasty. This should not be withdrawn, but should be kept in the tank to ripen.

After withdrawing sludge, all sludge pipes should be flushed out with clear water or clarified sewage so as to prevent stoppages from dried deposits. It is also well to backfill the sludge pipes with water or clear sewage if it can be done.

SLUDGE BEDS AND SLUDGE DISPOSAL.

While the sludge bed is a very important adjunct to a sewage tank, its management should not be a difficult matter. It should be quite porous, well underdrained and not too deep. Distributing troughs are of no practical use and are only in the way.

Beds containing freshly settled or only partially digested material are likely to cause offense from odors, and it often becomes necessary to cover such deposits with lime or earth to prevent nuisance. On the other hand, well-digested or good Imhoff tank sludge has very little odor.

Sludge can be handled faster by letting out a comparatively small quantity at a time, allowing it to dry, and then removing it from the bed before the next portion is drawn off.

Sedimentation tank sludge will probably require considerable time before it will be in a condition to remove from the bed, while well-digested and especially Imhoff tank sludge dries so rapidly that it may be removed in a few days. In cold weather, sludge is often advantageously removed in a partly frozen condition. In the same

manner shallow open settling tanks may be cleaned out. The liquids are drawn off and when the solids are partly frozen they are shoveled out.

The disposal of sludge will depend upon local conditions. It may be put on land, dumped into some low place or disposed of in other ways, according to circumstances. But care must always be exercised in handling or disposing of freshly settled or partly decomposed materials or else a nuisance is likely to occur. Good judgment on the part of the attendant, however, will usually take care of this part of the sewage disposal problem.

VINCENNES SEWERAGE SYSTEM

A Novel Plan of Financing Through Medium of a Private Corporation, With Full Municipal Control—Disinfecting Screened Sewage.

A paper before the Indiana Sanitary and Water Supply Association describing the new sewerage system at Vincennes was read by Robert C. Wheeler, the resident engineer, which contained two features of special interest—the proposal to use hypochlorite for sterilizing sewage which had been rough-screened, and a method of financing the proposition.

The system was completed in November, 1913, and contains about 40 miles of house sewers ranging from 8 to 30 inches in diameter; a pumping station (as it is necessary to pump the sewage during the high stage of the river), sterilization works, and a submerged outlet with multiple orifices into the Wabash river. The population of the city was 14,895 in 1910, but the system was designed to have ample capacity so that, with future extensions, it will serve a population of 30,000.

The sewage is passed through two sets of bar screens having clear openings of $\frac{3}{8}$ -inch and $\frac{7}{16}$ -inch, respectively, to remove the coarser solids which would tend to injure the pumps, clog the distributing outlet, to collect and putrefy on the river banks, or be offensive in the flowing stream.

The screen and suction chamber is so proportioned as to allow a detention period of from 10 to 15 minutes or more. This will give time for the hypochlorite to react and will generally allow the sedimentation of any particles which are so large that they would readily clog the orifices in the outlet pipe.

The apparatus for applying the hypochlorite solution consists of a chemical mixing box, two chemical storage tanks with electrically-operated agitators, an orifice box for measuring the amount of solution to be applied, and a perforated pipe for distributing the solution in the screened sewage.

It is proposed to use from 75 to 125 pounds of the commercial hypochlorite of lime to one million gallons of the partially clarified fresh sewage, depending upon the character of the sewage.

The screenings will be burned in an incinerator in the pumping station.

The distributing outlet consists of a 24-inch cast-iron pipe, extending into the river about 300 feet. In the last 120 feet are located 5 double outlets, 6 inches in diameter and about 3 feet apart. The purpose of this type of outlet is, first, to discharge the sewage under the water even in time of extreme low stage, so as to mix the sewage thoroughly with water and prevent nuisance, and, second, to conduct the sewage to a point in the river where the current is swift enough to prevent sedimentation and the formation of bars or deposits of sludge along the shore.

FINANCING.

The most unusual feature of this work is the method of financing. The ordinary procedure in the construction of sewers in Indiana is in one of three ways.

1. Under an appropriation by Council from the tax budget.
2. Under the assessment plan, where the cost is assessed against the property benefited.
3. By a bond issue.

The estimated cost of the system was \$334,500. This eliminated the first method, which is only practicable for short lengths of sewers such as laterals, etc.

The second method was considered inadvisable or impracticable under local conditions where public opinion was somewhat at variance as to the relative importance of sanitary sewers, storm drains, flood protection, street pavements, etc.

The third method would not have provided enough money, since the bonded indebtedness of Vincennes was limited to 2 per cent on an assessed valuation of about \$8,200,000, which would only have yielded \$164,000.

Finally, all the ordinary methods were abandoned for one reason or another and a new one was adopted. This plan in its final form was as follows:

The Common Council granted an association incorporated under the laws of the State as the Vincennes Sewer Association a franchise to build, operate, maintain, and extend a system of sewers which was fully defined both as to extent and quality, by plans and specifications which were made part of the franchise. The city agreed to provide compensation to the Sewer Association in one of three ways, at the option of the city, as follows:

- (a) The city pays an annual rental.
- (b) The city purchases the system at a price which decreases each year according to a schedule which is stated in the franchise.
- (c) The city allow the Sewer Association to operate as a public utility, charging patrons for the services rendered according to a schedule included in the franchise.

The first, or rental, basis is the program which is being followed at present and which will probably continue to be followed, unless the city finds it more advantageous to raise the necessary money and purchase the system.

The third alternative was introduced to protect the Sewer Association in case the city did not purchase the system and failed to pay the rental, taxes, insurance, operating expenses, etc. It comes into operation automatically upon the continued failure for sixty days on the part of the city to pay any of the amounts mentioned above.

In the first two cases the cost of maintenance and operation is borne by the city, which also is to keep the system properly insured. In the third case the city assumes no obligation and has no different relation from that with any other public utility, maintenance and operation being borne by the Sewer Association.

With this franchise as a basis, bonds were issued by the Sewer Association and were signed by the mayor merely to identify the bonds as being of the issue which they were represented to be.

The bonds draw interest at 6 per cent and the annual rental is such that it will pay the interest and retire all the bonds in 25 years. Thus, the selling price decreases each year until, at the end of 25 years, it is equal approximately to the rental due at that time. Upon the payment of this sum the title to the system passes to the city without further payment.

The annual rental is \$26,425, to be paid in equal semi-annual installments dating from Jan. 1, 1912, except that the first payment on July 1, 1912, should be \$8,500, instead of \$13,212.50, provided the system were half com-

pleted by that date, or if it were not half completed there would be due on July 1, 1912, so much of \$8,500 as the amount of work done was of 50 per cent. of the entire system, the remainder of the \$8,500 being retained until 50 per cent. of the work was completed.

The city has the right to purchase the system after 30 days' notice in writing to the sewer company at the following respective prices:

Year.	Price.	Year.	Price.
Jan. 1,		Jan. 1,	
1914.....	\$334,675	1926.....	\$215,200
1915.....	328,000	1927.....	200,900
1916.....	320,350	1928.....	186,100
1917.....	312,625	1929.....	169,650
1918.....	303,925	1930.....	152,750
1919.....	295,200	1931.....	134,275
1920.....	285,475	1932.....	115,350
1921.....	275,725	1933.....	94,850
1922.....	264,975	1934.....	73,300
1923.....	253,700	1935.....	50,250
1924.....	241,400	1936.....	25,650
1925.....	229,100	1937.....	13,000

From this table it appears that the payment of \$13,000 on Jan. 1, 1937, gives the city the title to the system.

Assuming maintenance, pumping, operation, insurance, etc., to be \$5,000 per year; rental, \$26,425; annual cost will be \$31,425.

On the basis of the present population of 15,000 and an annual cost of \$31,425, the per capita annual cost will be a trifle over \$2. This cost includes not only sewer service, but also an amount to be applied to the purchasing of the system. That is to say, that at a cost of a little more than \$2 per capita annually for 25 years the city may secure sewer service and at the end of that time own the system in a well-maintained condition and of a size and extent such that it will not have to be paralleled while the population is doubling in amount.

So far as I know, this is the first sewer system in Indiana to be built under this method of financing, but the results on the whole have been and promise to remain very satisfactory.

Especial care should be taken in drawing the plans and specifications when proceeding under this method to give them proper flexibility and to define clearly the exact position of the city as regards inspection, engineering and overseeing construction.

In the Vincennes work the city's only representative on the ground was the resident engineer, acting under the Board of Public Works. His duties were to act as advisor to the Board in regard to suggestions as to changes in the plans, to have general oversight of the work and pass on materials and workmanship, and to make a final inspection of the system and recommend its acceptance or rejection by the Board of Public Works.

Estimates of cost upon which payments during construction were based were made by Mr. George W. Sturtevant, of Chicago, acting as engineer for the Sewer Association.

The contractor furnished his own lines and grades according to the contract drawings or supplementary drawings furnished by the resident engineer, and at the completion of the work furnished the city with record plans of the system as constructed.

While this arrangement was reasonably satisfactory at Vincennes, it would probably be advisable as a rule for the city to have more complete control by furnishing lines and grades, keeping all records, making estimates of cost, and maintaining more thorough inspection.

With these points carefully considered, this method of procedure may help to solve the problem for other towns where otherwise a lack of funds may prohibit the construction of the whole sewer system at once, and where, as at Vincennes, a relatively expensive outfall

may put too heavy a burden on the first section to permit proceeding by sections under the assessment plan.

The system was constructed by the Vincennes Sewer Association under the direction of the Board of Public Works, consisting of Mayor James D. McDowell, Joseph V. Hershey and William P. Ritterskamp. The general contractors were Stewart Sheets & Co.

The plans and specifications were drawn by Hering & Fuller and the work was superintended by George W. Fuller, Robert C. Wheeler being resident engineer. Harry Watts, engineer for the contractor, gave lines and grades and drew the record plans.

STREET OPENINGS

Practice in Forty-Nine Cities Regarding Making House Connections to Sewers, Water and Gas Mains—Licensing and Bonding Plumbers.

Some time ago information was collected by the Clearing House of the American Society of Municipal Improvements concerning the practice of a number of cities throughout the country in connection with the opening of streets for the laying of water, sewer and gas connections. The replies received are compiled in the following statement.

Replies were received from the following 49 cities: Birmingham and Tuscaloosa, Ala.; Fort Smith and Pine Bluff, Ark.; Santa Barbara, Cal.; Wilmington, Del.; Columbus, Ga.; Boise, Idaho; Richmond, Ind.; Creston and Des Moines, Ia.; Pittsburg, Kan.; Baltimore, Md.; Minneapolis, Minn.; Kalamazoo, Mich.; Concord, N. H.; Elizabeth, Newark and Trenton, N. J.; Batavia, Binghamton, Elmira, Hudson, Richmond Borough, Rochester and Syracuse, N. Y.; Grand Forks, N. D.; Lima, Ohio; Tulsa, Okla.; Erie, Farrell, Meadville, Norristown, Pittsburg and Wilkes-Barre, Pa.; Pawtucket, R. I.; Charleston and Columbia, S. C.; Nashville, Tenn.; Abilene, Austin, Dallas and Fort Worth, Tex.; Norfolk, Va.; Racine and Waukesha, Wis.; Lethbridge, Alta.; Montreal, Que., and Winnipeg, Man.

The first question asked was "Whether drain and sewer connections (also water and gas services, where the city does not own its gas and water plants) are laid by the city or by plumbers." Sewer connections were reported to be laid by city employees in Wilmington, Columbus, Baltimore, Kalamazoo, Elizabeth, Newark, Trenton, Binghamton, Hudson, Erie, Norristown, Wilkes-Barre, Columbia, Norfolk and Lethbridge. The city lays to the curb only and plumbers from there on in the case of Trenton and Binghamton, and possibly in others where it was not stated. In the remaining cities sewer connections are laid by plumbers, except for eight cities which did not answer this question.

Connections to water mains are laid by city or water department employees in Santa Barbara, Wilmington, Baltimore, Kalamazoo, Concord, Newark, Trenton, Hudson, Tulsa, Erie, Meadville, Wilkes-Barre, Columbia, Austin, Norfolk, Waukesha, Lethbridge and Winnipeg. In Baltimore and Trenton the city lays to the curb line only. In the cities not named, water connections are laid by plumbers; six cities not reporting.

Gas main connections are not laid by city employees in any of the cities.

The next question was as to the charges for making connections where they are laid by the city. It was learned that Wilmington charges 60 cents per lineal foot in addition to the cost of relaying the pavement, for sewer connections; while water connections are laid at the expense of the city. Columbus charges the actual cost. Baltimore carries sewer connections to the property line without cost; water connections are laid to a point just

inside the curb, the charge being \$12, regardless of length. Connections made by the city in Concord, Elizabeth, Rochester and Dallas are charged for at the cost of the work, and in Hudson at cost plus a percentage for the use of tools. Newark charges cost plus 10 per cent for sewer connections, while Erie lays sewer connections at cost and water connections free. Newark charges \$14 for a water connection, Trenton \$15, Elmira \$10, Wilkes-Barre \$4.50 for the tap, the owner laying the rest of the connection; Austin, \$2.50. Binghamton charges 80 cents a foot for sewer connections; Wilkes-Barre \$1 per square yard for repaving dirt streets and \$3 per square yard for brick and asphalt, and \$10 per family for the connection.

The next question asked was whether, in case connections were not laid by the city, the excavating, backfilling and repaving are done by city employees or by plumbers or private corporations. The excavation was reported as being done by the city in the case of Pine Bluff, Richmond, Hudson, Grand Forks, Erie, Columbia, Abilene, Austin and Winnipeg. Backfilling is done by city employees in Fort Smith, Elizabeth, Binghamton, Hudson, Grand Forks, Charleston, Columbia, Nashville, Dallas, Racine, Montreal and Winnipeg. The repaving is done by the city in all but Pine Bluff, Santa Barbara, Richmond, Creston, Des Moines, Pittsburg, Kan.; Tulsa, Farrell, Norristown, Pawtucket, Abilene and Fort Worth. The city charges for the repaving, the actual cost of the work in Birmingham, Tuscaloosa, Columbus, Concord, Elizabeth, Trenton, Binghamton, Elmira, Rochester, Tulsa, Columbia, Austin, Waukesha and Montreal. Boise has the work done by a paving contractor and charges the property owner the contract price plus 10 to 20 per cent. Kalamazoo charges the cost plus a percentage for use of tools, as do also the Borough of Richmond, N. Y., Meadville and Dallas. Erie charges \$1.75 per square yard for asphalt or brick, and 50 cents for block stone. Nashville charges \$1 for granite and \$3 for bitulithic per square yard. Newark charges 65 cents a square yard for block pavement on sand and \$1.90 on concrete, and \$2.50 for asphalt. Pittsburg, Pa., charges \$10 for first class pavement, \$3 for second class and \$1 for dirt road, for the first 3 square yards, or less, and \$2 and 50 cents, respectively, per square yard for all over 3 yards; for more than 100 square yards the actual cost of labor and materials plus 15 per cent is charged.

Most of the cities exercise some control over the plumbers, requiring at least a license to be taken out by all who do work of this kind. Bonds are required by the city to cover the restoring of street openings (and in some cases drainage resulting therefrom) in the following amounts: Birmingham, Pittsburg (Kan.), Baltimore, Erie, Wilkes-Barre, \$500. Tuscaloosa, Wilmington, Newark, New York, Grand Forks, Tulsa, Farrell, Meadville, Pawtucket, Nashville, Abilene, Austin, Fort Worth, Norfolk, Waukesha, \$1,000. Fort Smith, Minneapolis, Elmira, Rochester, Racine and Winnipeg, \$2,000. Santa Barbara requires a cash deposit of 10 to 30 cents per square foot of surface area or a bond of \$1,500. Boise requires a bond of from \$1,000 to \$2,000 by the utility companies. Pittsburg, Pa., requires a bond of \$500 for a single opening, or \$2,000 for a number of openings. A deposit is required in each instance by Pine Bluff and Syracuse. Concord requires no bond, but license may be revoked. Columbus requires no bond, nor does Binghamton.

Plumbers are licensed in all of the cities except Birmingham, Boise, Batavia, Farrell, Abilene, Dallas, Waukesha, Lethbridge and Winnipeg.

Plumbers are not only licensed, but are examined in a majority of the cities. The examining boards are constituted as follows: Birmingham, plumbing inspector;

Fort Smith, plumbing inspector, 2 master plumbers and 2 journeymen; Pine Bluff, 3 master plumbers and 2 journeymen plumbers appointed by the Mayor; Wilmington, plumbing inspector and 2 master plumbers; Columbus, plumbing inspector; Des Moines, a master plumber, plumbing inspector and city physician; Baltimore, commissioner of health and 4 men appointed by Governor; Minneapolis, plumbing inspector, water works registrar, the plumber of the Health Department, one master plumber and one journeyman plumber; Kalamazoo, one journeyman plumber and one master plumber appointed by the Board of Health, the city engineer, water commissioner and city plumber; Concord, city engineer, a journeyman plumber and a member of the Board of Health; Elizabeth, the Board of Health; Newark, 2 master plumbers and one journeyman plumber; Binghamton, 3 master plumbers appointed by the Mayor; Elmira, plumbing inspector, city engineer, 2 master plumbers and one journeyman; Hudson, 3 master plumbers and the superintendent of public works; Rochester, an examining board of plumbers, including the city engineer, chief inspector of the Health Department and 3 plumbers; Syracuse, city engineer, plumbing inspector, 2 master plumbers and one journeyman; Erie, plumbing inspector and 2 master plumbers; Norristown, Board of Health; Pittsburg, Pa., one master plumber and one journeyman plumber appointed by the Mayor, a chief plumbing inspector and the superintendent of the Bureau of Sanitation; Wilkes-Barre, building inspector, one master plumber, one journeyman and a health officer; Pawtucket, inspector of plumbing, city physician and master plumber; Charleston, city engineer, health officer, assistant city engineer, one master plumber and one journeyman; Columbia, plumbing inspector; Nashville, plumbing inspector, health officer and city engineer; Austin, city physician, city engineer, plumbing inspector, a master plumber of ten years' experience and a journeyman of five years' experience; Fort Worth, city engineer, city plumber and a master plumber appointed by the Mayor; Norfolk, health commissioner, plumbing inspector, one master plumber and one journeyman; Racine, Board of Public Works and plumbing inspector; Montreal, chief health officer and sanitary engineer.

EXPLOSIONS IN SEWERS*

Investigation of Instances and of Causes and Preventive Measures—Illuminating Gas or Gasoline Generally the Cause—Agents of Ignition.

By H. J. KELLOGG.†

The Department of Public Works of New Haven, Conn., has been for the past year and is still investigating the causes for explosions in sewers and underground conduits, and endeavoring to find means of preventing such explosions. In New Haven, about twenty years ago, while four men were cleaning a 54-inch circular brick sewer, an explosion knocked the men down and momentarily stunned them, broke a pick handle and bent the framework of the iron truck which was used to carry the sewage deposits, and apparently exhausted the oxygen in the air so that the men were nearly suffocated before they could reach the manhole opening. Incidentally, it blew the water out of the sewer, a great deal of it being forced back through the house connections into the plumbing appliances. Two of the men were disabled for six months or more. One of them, Daniel Lawler, who is now superintendent of sewers,

said that there appeared to be a great ball of fire coming like a bolt of lightning from the upper end of the sewer. There was a gas plant nearby, and in those days the manufacture of by-products from gas wastes was very limited, also gas drips were run directly into the sewer where it was convenient; and it is believed that illuminating gas had been ignited by the lanterns carried by the men.

About a year ago, in another New Haven sewer, 42-inch egg-shaped brick, there was an explosion while men were inside cleaning it, and they were burned about the faces and hands but were not otherwise injured. In this case illuminating gas did not appear to be the cause, but it was believed to be due to waste benzine or naphtha mixture used by the National Paper Box & Paper Company for cleaning lithographic stones. The evidence against this was by no means strong, but a gasoline odor was noticed by the men before they entered the sewer, and no garages were known of located above that point. The manholes had been left open for a length of time that was thought sufficient to clear the sewer atmosphere, and ordinary lanterns were carried. This second explosion led to the adoption by the sewer department of a small, neatly-made dry battery lantern carrying a small mazda lamp. Smoking and lighting of matches in the sewer is forbidden, and it is believed that this will prevent explosions while men are working in the sewers.

These are the only instances in New Haven where lives have been endangered from sewer explosions, although several small explosions have been caused by unknown agencies. The earliest of these latter explosions occurred in 1886, when the arch was blown completely off of a 60-inch circular brick sewer for about 50 feet each side of a railroad track which it passed under. No information was ever obtained as to the cause. This is the only instance in that city of damage to a sewer by an explosion.

A number of explosions have occurred in underground wire conduits, some of them serious and expensive. In Bridgeport, about two years ago, a manhole cover was blown off by ignited illuminating gas, and the gas continued to burn for hours before it could be stopped, the sheaths around the cables and the insulations being destroyed. In the same city, two years earlier, an explosion in a conduit manhole broke forty panes of glass in adjacent buildings. A riser pipe had been cut off just above the curb, and a ventilator cap on this permitted the escape from the manhole of any illuminating gas. A boy striking a match on this ventilator cap started the trouble. In the same city a spark given off by a trolley car on a gritty rail touched off a blast that blew up 675 feet of ducts. The telephone company of Hartford, Conn., received \$5,000 damage from the gas company of that city for an explosion caused by illuminating gas. Ventilated manhole covers have checked this line of conduit troubles, but a bad break in a gas main would threaten the underground system, as trolley car wheels or horse shoes sprinkle sparks. In Columbus, Ohio, according to C. J. Lauer, chief of the Fire Department, there have been two explosions in underground conduits for telegraph and telephone wires, caused by accumulations of natural gas which were touched off by the fire engines passing over the manholes and igniting the accumulated gas. In one of these instances a heavy telephone manhole cover was blown off and some damage done to the wiring inside.

Pittsburgh holds the world's record for the wreck of a sewer from an explosion, and no community cares to wrest that distinction from it. It is hard to believe that over a mile of an 8-foot sewer could have been completely shattered from one convulsion; but so it was,

*Abstract of paper before the Connecticut Society of Civil Engineers.

†Assistant City Engineer of New Haven, Conn.

and it may cost half a million dollars to repair the damage. The engineers of the Department of Public Works have been able to assign no cause for the explosion. Impressed by this Pittsburgh explosion, the New Haven authorities sent inquiries to a number of cities all over the country asking for any information as to similar occurrences. Albany, N. Y., Newport, R. I., New London, Conn., Springfield, Mass., Denver, Colo., Portland, Ore., Seattle, Wash., and Savannah, Ga., reported no trouble from explosions, but other cities have suffered more or less. Among these are Louisville, Ky., Charleston, S. C., New York City, Philadelphia, Syracuse, Providence, R. I., Buffalo, N. Y., Washington, D. C., Fall River, Mass., Detroit, Mich., Brooklyn, N. Y., Cleveland, O., Worcester, Mass., St. Paul, Minn., Kansas City, Mo., Duluth, Minn., Los Angeles, Cal., Baltimore, Md., Hartford and New Haven, Conn., Pittsburgh, Pa., and San Francisco, Cal.

In Charleston an employee lighted a cigarette and threw a match into a manhole just uncovered. At another time two men were caught by a flash in a sewer which singed their hair. In Philadelphia an explosion attributed to gasoline vapor injured several men recently. On another occasion a suspicious smell was noticed upon opening a sewer manhole, and a blazing paper was thrown in, resulting in a column of flame about 40 feet high, due to gasoline from a nearby factory. About two years ago two men were killed in that city owing to a leaky gas main which ran parallel with the sewer, and about a year and a half ago a man was burned from gasoline from a dry cleaning shop. In Detroit, on January 28, 1914, an explosion occurred due to gasoline which caused damages running into the thousands, and the force of which extended for a distance of 19,000 feet.

George H. Norton, deputy engineer commissioner of Buffalo, N. Y., wrote: "For three years past, at periods of thawing weather following frost and heavy snow, we have had serious complaint from gas odor in some of our sewers. This has been traced down and found to be due to the use by the railroads of what is called hydrocarbon oil, which is used by them to prevent freezing of their switches and interlocking plates in the passenger station yards and at other congested points. An examination was made by our city chemist, and he reports that at low temperatures this oil will crystallize, that such crystals are soluble in water, and for this reason he thinks that the gases have passed the ordinary vent sewer trap. The gases arising from this oil are apparently highly explosive, and could readily be the cause of a serious explosion. This oil is a by-product from the Pintsch gas used for car lighting. After a lengthy consultation with the railroad authorities, they have agreed to discontinue the use of this oil in their yards."

Hartford had two serious explosions in sewers in 1913, one lifting a manhole head and throwing several covers into the air and shattering windows in adjoining houses. This and the second also took place near the works of the Gas Light Company, and suits against the company were brought by property owners.

The inspector of combustibles of New York City reported that since June 5, 1912, there have been eleven sewer explosions, but as conditions in the sewers are so complex and opportunities for observation so limited no definite knowledge could be obtained of the causes of the explosions. As far as they can judge, however, the probable causes are gasoline, illuminating gas and calcium carbide. "Prior to the regulation requiring the installation of oil separators in garages, the larger number of sewer explosions was limited to what is known as the garage zone, lying west of Broadway to the Hud-

son river between 40th and 60th streets. Since their installation, the number of explosions has been greatly reduced. Illuminating gas enters the sewers from ruptured, corroded or broken gas mains or from leaky joints, and when mixed in the proper proportions with air forms an explosive mixture. Calcium carbide, which is used in garages for generating light, may be thrown into the sewer, and when in contact with water generates acetylene gas, which is an intense explosive and is also auto-combustible, so that in many instances it may be lighted by its own heat generated in evolving the acetylene. The vapors of gasoline and illuminating gas require an open flame to ignite them, but how this occurs in sewers it is impossible to tell; but in vaults and in conduits the igniting spark is furnished in a number of cases by electrical apparatus, such as switchboards, sump pumps, short-circuiting, etc. * * * In relation to places where oil is stored, the oil separator is the only method at present under the regulations for preventing volatile inflammable oil from discharging into the sewer."

It is difficult to compel garages to install oil separators, however. A letter from the Ansonia Manufacturing Company, of New York, which makes oil separators, says: "The garage owners at one time combined and fought the ordinance in the courts, and after several appeals finally lost their case, with the result that this matter will be pushed harder than ever. Their contention was that it was an injustice to impose such expense on the small garage owners and individuals, because they felt it was entirely out of their means to comply with this ruling. * * * Some of the boroughs make a distinction between private and public garages by calling any garage which stores more than two cars a public garage, and make only public garages subject to the ordinance."

Illuminating gases can be kept out of the sewers more easily than out of wire conduits, as the latter lie nearer the surface and afford better channels for the escape of the gas that may accumulate under the nearly gas-tight pavements. In New Britain it is intended to have ducts calked with oakum and some impervious substance like tallow that can easily be taken out and replaced. Also greater care is generally taken now in laying gas mains and calking joints. New Haven is considering requiring every garage to have an inexpensive sump or catch basin for receiving waste oils, and that the Department of Public Works be notified whenever these need cleaning and will then clean the basins and dispose of the dangerous matter in a way to prevent explosions and fires. This probably will be adopted for dry cleaning shops only. Garage sumps would not be likely to retain the oil, which would probably be evaporated, while oil separators have a receptacle to catch and hold all oils.

One volume of gasoline is said by Professor Dean to produce 141 volumes of vapor, and one part of this vapor to 62½ parts of air to furnish the best mixture for complete combustion. On this basis, one gallon of gasoline would furnish a mixture of maximum explosiveness for about 150 feet of 42-inch sewer, although, of course, consideration should be had of the time required to vaporize the oil, the motion of the air in the sewer and other factors which would complicate the problem. Gasoline vapor is heavier than air, while illuminating gases are lighter; therefore ventilated manhole covers furnish outlets for the latter, but gasoline vapors will not escape in this way. But good ventilation of the sewers would appear to minimize the danger, especially from illuminating gas. (In New Haven there

appears to be no method of ventilating the sewers, either through manhole heads or house connections.)

On the subject of ordinances designed to protect sewers from combustibles, Mr. Kellogg quotes the Washington ordinance as being perhaps as good as any, this being as follows: "No person shall make or maintain any connection with any public sewer or appurtenance thereof whereby there may be conveyed into the same any hot, suffocating, corrosive, inflammable or explosive liquid, gas, vapor, substance or material of any kind; and no person shall cause to enter or flow into any public sewer or appurtenance thereof any hot, corrosive, suffocating, inflammable or explosive liquid, gas, vapor, substance or material of any kind; provided, that the provisions of this paragraph shall not apply to water from ordinary hot water boilers of residences." There are also rules for the installation of garage traps. The virtue of such an ordinance, however, lies in the enforcement of it, and all cities, both large and small, find this to be very difficult, and probably all are aware that there are numerous violations without being able to detect them.

BROOKLYN EXPERIMENTAL SEWAGE DISPOSAL PLANT

Sprinkling Filters, Aerating Filter, Settling Tanks and Sludge Beds—Details of Construction.

(Continued from page 236.)

The sprinkling filters consist of a large square tank divided into four equal sections by middle partitions. The partitions are of 3-inch plank, and presumably tight, but the side walls are composed of plank slats set at an angle of 45 degrees in concrete piers, thus preventing the filter medium from escaping while giving a maximum admission of air. (See Figs. 4 and 5.) Each of the four sprinkling filters is 16 feet square and is 10 feet deep from top of stone to top of underdrain. The bottom is of concrete, upon which rest half-round 6-inch pipes as underdrains. Test boxes are placed in the broken stone at depths of 8 feet 6 inches, 7 feet 3 inches and 6 feet below the surface of the stone, these consisting of horizontal V-shaped troughs connected to the outside of the tank by small pipes provided with faucets, by means of which the sewage can be drawn from the filter at different depths. One adjustable nozzle is supplied for each of the four sections of the sprinkling filter, the supply to the nozzle being furnished by a 5-inch siphon discharging into a box which has the shape

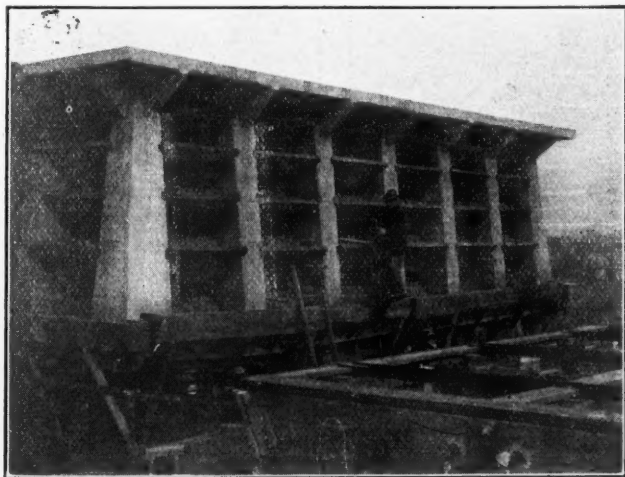


FIG. 4. SPRINKLING FILTERS, SHOWING CONSTRUCTION OF SIDES.

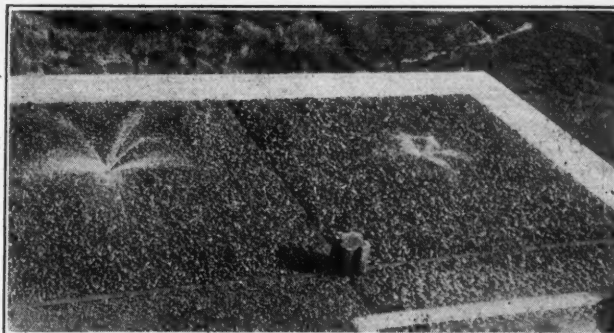


FIG. 6. SPRINKLING FILTERS—VIEW FROM IMHOFF TANKS.

of an inverted truncated pyramid. On its way to the siphons the sewage, whether raw or Imhoff effluent, may be passed through a small gravel strainer or roughing filter about 3 feet square and containing about 12 inches depth of gravel resting on a wire screen of $\frac{1}{4}$ -inch mesh; or this may be cut out of the line and the sewage enter the siphons without straining.

The aerating filter tank is circular, 11 feet 9 inches in diameter, with a sprinkling nozzle in the centre, and divided into two equal parts by a vertical plank partition. It is about 14 feet deep to the top of the drain tiles which cover the floor. Resting a few inches above this is a grid of $\frac{3}{4}$ -inch iron pipe for admitting compressed air, similar to the one previously described for the aerator tank, except that it contains four rings of pipe instead of five, and that each of these is divided into two half rings, which are separated by the partition which divides the tank into two aerating filters of equal size, in either one of which compressed air may be admitted while it is excluded from the other, so that a comparison can be made of the action of the two under conditions similar in all respects except as to aeration.

The settling tanks are boxes 8 feet square, with vertical sides 5 feet deep and the bottom a pyramid, the sides of which are at a slope of 45 degrees. These tanks are of concrete with walls 14 inches thick, the whole resting directly upon piles. A 4-inch inlet pipe, with an elbow and vertical nipple at the end admits the sewage, the bottom of the nipple being three feet above the vertex of the inverted pyramid which forms the bottom of the tank. In the centre of each tank is a 6-inch sludge discharge pipe terminating at the bottom in a bell mouth, the vertical section of this sludge pipe rising to a point slightly above the top of the tank, where it terminates in a flange covered with a plate, the object of this construction being to permit cleaning out the sludge pipe. The sewage overflows from these tanks through V notches, of which there are two in each side, into wooden troughs which completely surround each tank.

The six secondary sprinkling filter settling tanks are in the form of inverted truncated pyramids 10 feet 6

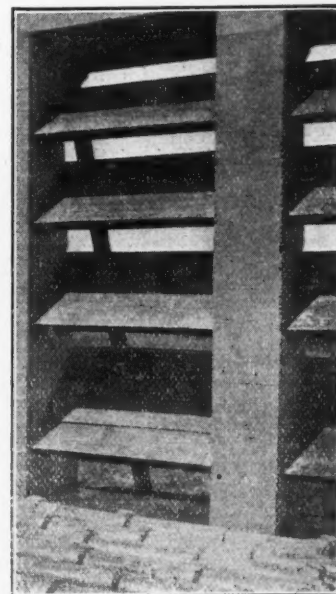
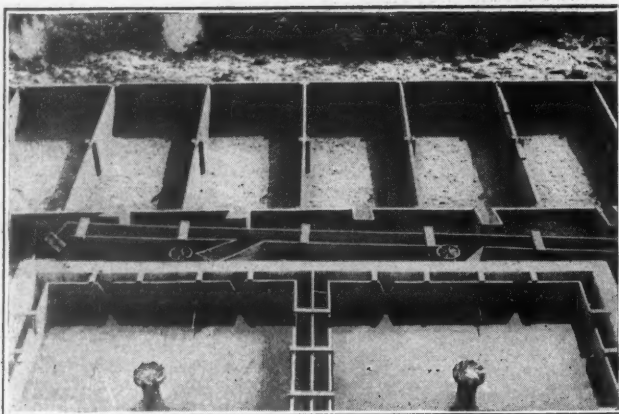


FIG. 5. SPRINKLING FILTER DETAIL. Construction of slat sides and underdrains.

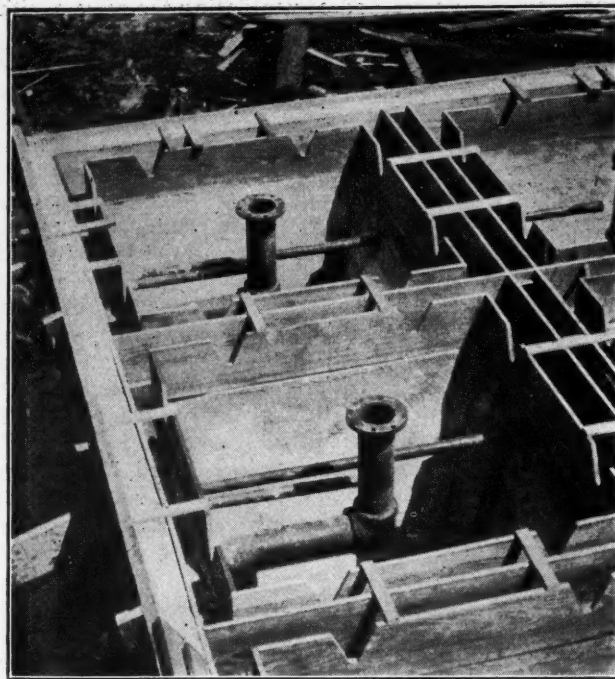


SETTLING TANKS, PARTLY FILLED; SLUDGE DRYING BEDS BEYOND.

Top of sludge clean-out pipe in center of each tank.

inches deep, 5 feet 7½ inches square at the top and 1 foot square at the bottom. These are surrounded with notched flumes, as are the other tanks, the effluent is admitted through a 2-inch pipe which ends at a point three feet above the bottom, and the sludge is discharged through a pipe ending in a bell mouth terminating about nine inches above the bottom. These tanks are of concrete 9 inches thick.

The Imhoff sludge beds, ten in number, are arranged side by side in a box 50 feet long by 12 feet wide, each bed being 5x12. In the middle of each bed, parallel with the longest sides or partitions, a 6-inch half round vitrified pipe is placed in the bottom for a drain. This is covered with eight inches of cinders, on top of which rests one inch of sand. The sludge is admitted to each through a short flume at the centre of one end, the bottom of this flume being about an inch above the surface of the sand bed. The sludge is brought to the tanks in

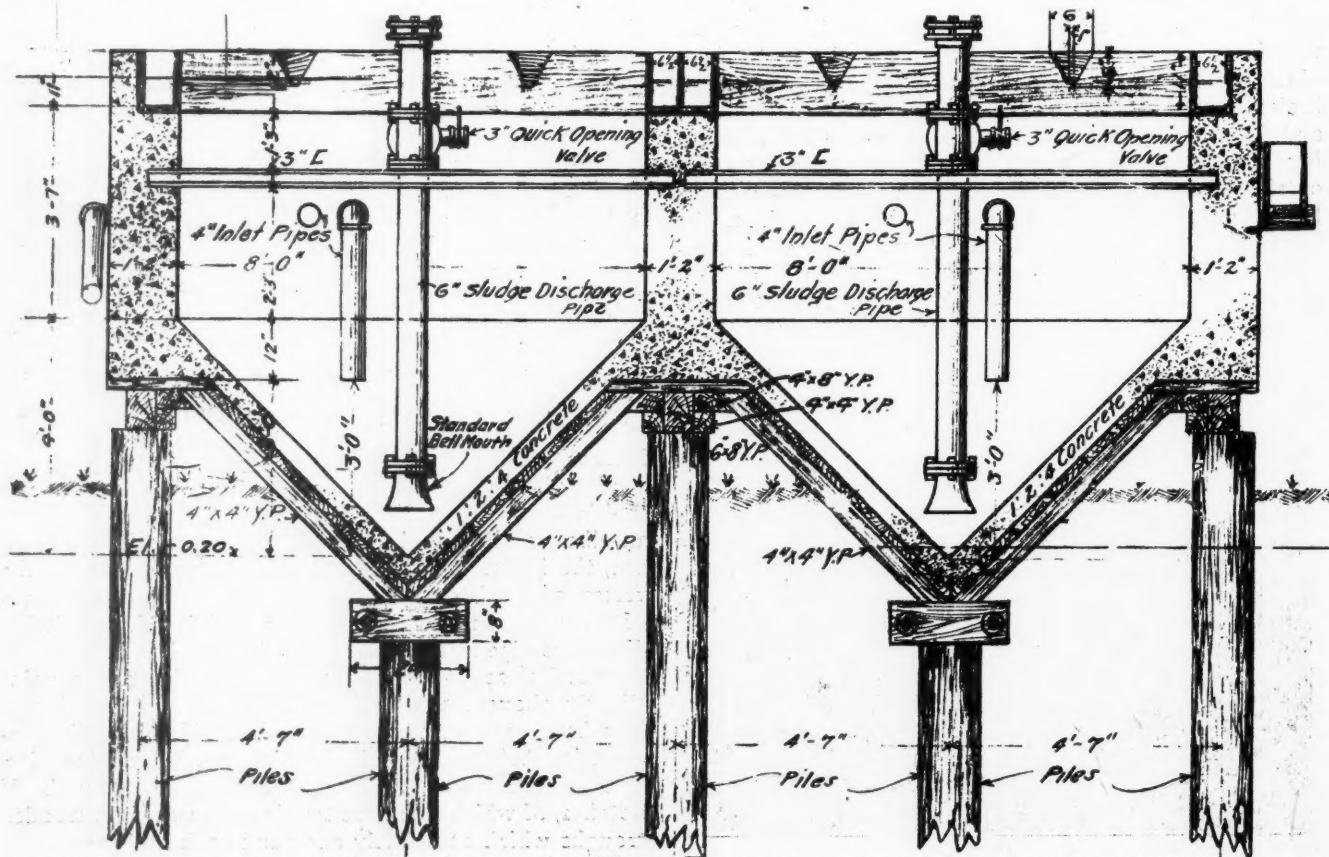


SPRINKLING FILTER SETTLING TANKS.

Showing supply pipes; sludge pipes (caps not yet placed on clean-outs); notched flumes for receiving effluent.

a flume 8 inches wide and about 20 inches deep, and having a slope of 1 in 20. A 3-inch gate valve with a 3-inch nipple and flange on either side connects this flume with each of the ten short flumes which supply the sludge to the individual beds.

During the course of the experiments it is intended to add other features to the plant from time to time, some of which will be for the purpose of studying fine screening, disposal of screenings and sludge, dilution of



DETAILS OF SETTLING TANKS

sewage, and for the disinfection of sewage effluents from various units.

The plant was designed and constructed and the experiments are being conducted by the Bureau of Sewers of Brooklyn, E. J. Fort, M. Am. Soc. C. E., chief engineer; George T. Hammond, designing engineer, and William T. Carpenter, chemist.

PROVIDENCE STREET RAILWAY TUNNEL

Substitute for Present Street With Sixteen Per Cent Grade, on Which Is a Counterweight Street Railway—Methods of Construction.

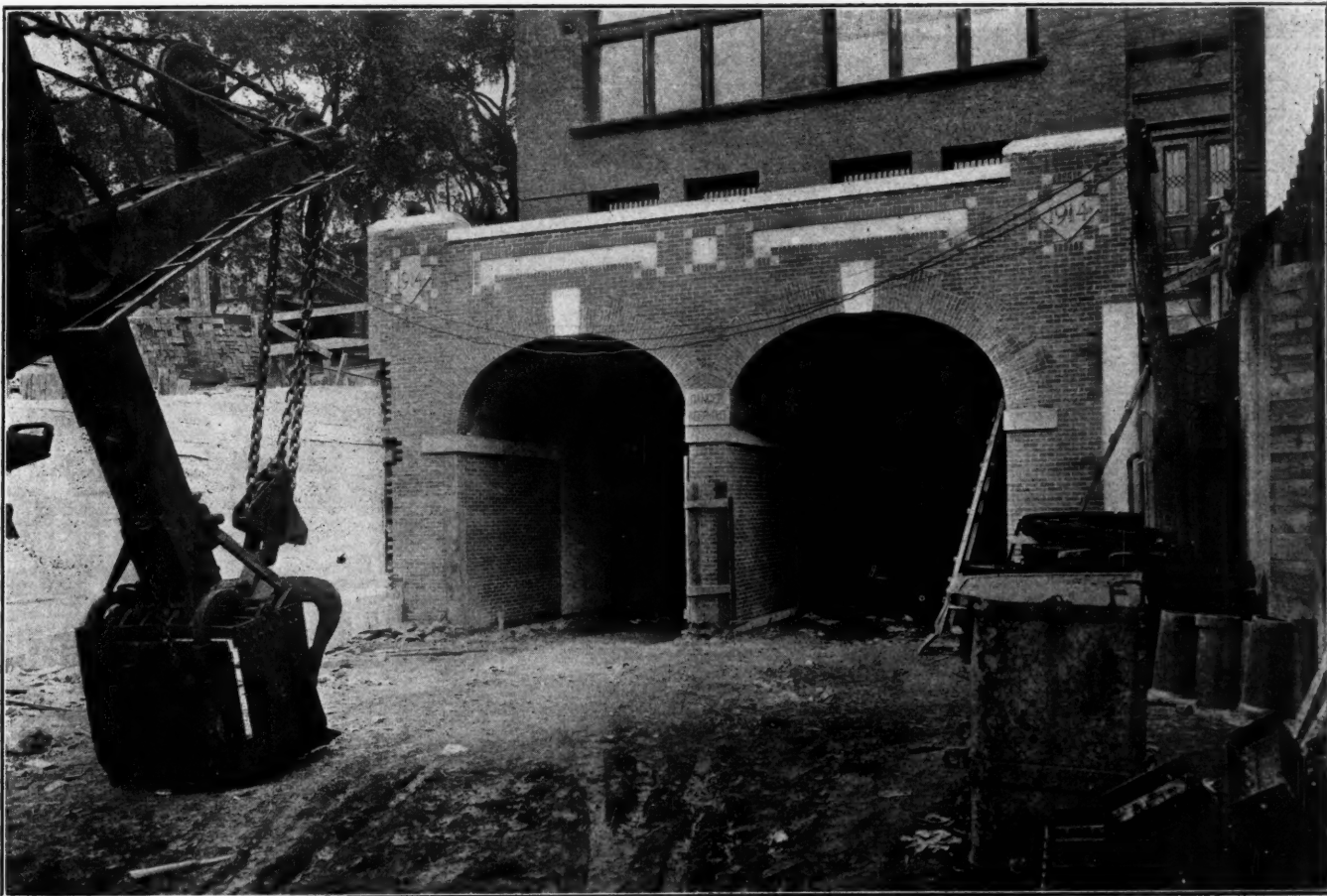
By JOHN R. HESS.

In co-operation with the Rhode Island company which controls the street railway system of Providence and vicinity the city of Providence, R. I., is constructing a tunnel and street approach which is expected to cost about \$900,000. The east side of the city is upon a hill with a steep western slope to the business centre, the main approach to which is by a street with a 16 per cent grade. At present a street railway carries passengers up this grade with the help of a counterweight; but the rate of travel is slow, and occasionally a stall for five or ten minutes is occasioned by difficulties with the machinery.

Various tunnel projects have been before the city during the past thirty or forty years. The one finally selected was recommended by G. Richmond Parsons while a member of the City Council. It taps Exchange Place practically on a line with the city hall and new Federal building, and affords direct access to the N. Y., N. H. & H. R. R. station which fronts on Exchange Place and to all the street railway lines extending to the north,

south and west. When the tunnel is open to traffic it will furnish to the east side the rapid transit of which it has so far been deprived. The tunnel proper is being built by the Rhode Island company under the direction of Heaton R. Robertson, chief engineer of construction, and the street between the post office on Exchange Place and the west portal was opened during the past few months by the city at a cost of \$200,000, involving the removal of the Arnold block and other heavy buildings. It provides more direct access to the top of the hill also, being in line with Waterman street, one of the main business streets, doing away with a bad right angled turn at the foot of the hill. In place of the 16 per cent grade the tunnel affords to the electric cars a uniform grade of 4.8 per cent. The tunnel is expected to be ready for cars in May or June of this year.

The tunnel extends from the west portal on North Main street for a distance of 2,165 feet eastward to the easterly portal on Thayer street. From North Main street for 190 feet there is a descending grade of 1.4 per cent, made necessary by the existence of the Rhode Island School of Design and two buildings known as the Carr buildings, under which the tunnel is required to pass. The first of these rests directly upon the roof of the tunnel, the building standing but 10 feet back from the face of the portal. The basements of the Carr buildings are from 7 to 12 feet above the roof of the tunnel. From this point the grade rises uniformly at 4.8 per cent to the short vertical curve which connects it with the grade of Thayer street. About 600 feet before reaching Thayer street it passes over the tunnel of the N. Y., N. H. and H. R. R., the roof of which is about 25 feet below the floor of the tunnel. Both the long rising section and the short descending section of the tunnel drain to a catch basin at the low point, which is connected with the Main street sewer. The greatest



WEST PORTAL OF PROVIDENCE TUNNEL. SCHOOL OF DESIGN IN BACKGROUND.

depth of the tunnel beneath the ground surface is 60 feet. The excavation, including overbreak, is 24 cubic yards per lineal foot; the concrete amounts to $4\frac{1}{2}$ cubic yards per lineal foot.

The width of the tunnel between neat lines is 25 feet; the height is $17\frac{1}{2}$ feet at the centre and 16 feet 5 inches at the centres of the tracks. The roof is a three-centre ellipse, the radius of the two end arcs being 8 feet 6 inches and that of the middle arc 15 feet. The thickness of the walls is 24 inches in rock and 30 inches in heavy ground; and that of the arch is 18 inches at the centre in rock and 24 inches in heavy ground; except that under the Carr buildings it varies from 30 to 36 inches thick. Under the School of Design the roof is flat, composed of steel beams and connecting arches.

The ground encountered in the first 450 feet was firm glacial till, underlying about 6 feet of sand, gravel and clay. From this point to a few feet east of the east portal the material was carboniferous graphitic schist, much distorted and fractured by compression. The first 95 feet at the west end was in open cut, with masonry retaining walls. The last 280 feet at the east end is also an open approach with retaining walls, and the tunnel for 75 feet west of that was excavated in open cut which was afterward filled in when the arch had been constructed.

Construction work was divided as to methods into five parts: Excavation and grading and constructing the concrete retaining walls at the approaches; the steel and concrete roof under the School of Design; the special method of constructing the arched tunnel under the Carr property; the main tunnel, and the 75 feet of cut and cover tunnel adjoining the east approach.

Had work been commenced at the west portal and the material hauled out to Main street, the long portion of the main tunnel would have been delayed until the slow work under the School of Design had been finished, and could not have been handled to advantage until that under the Carr property adjoining had been nearly completed. The tunnel was too short to make it profitable to install a separate plant at each end, and to begin the work at the east end on a descending grade would have made probable interference from water if this were encountered in any great quantity. Accordingly, a shaft was sunk in the first street east of the west portal and about 200 feet from it and the excavation of the main part of the tunnel was carried on eastward from this, while at the same time the shorter and more difficult portion to the west of it and under the three buildings was being constructed.

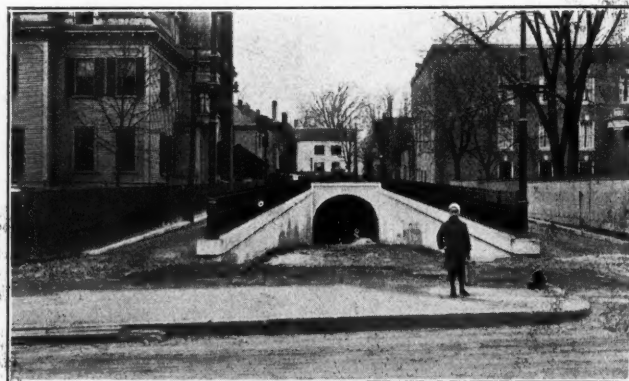
The excavated material was hoisted to the surface through the shaft and hauled by an electric motor in 3-yard cars through the streets to a trestle built over a spur track on the steam railroad, where it was dumped into standard gauge cars or into storage bins. From here it was carried in these cars by night and dumped at a trestle in the Seekonk river, thus giving a solid fill on the railroad location out to the harbor line. The material excavated from under the buildings was hauled by team and dumped into the cars or storage bins at the same point. A small drift was driven from the shaft to the west portal early in the work and connected with the Main street sewer to provide drainage.

The School of Design was temporarily supported by needle beams through the north wall of the building and through a longitudinal brick partition wall opposite, following which the excavation for the tunnel walls was made in trenches and the concrete walls placed. These walls replaced the foundations of the building. The cross walls and partitions of the building were supported in like manner until steel girders resting on the side walls and on centre columns of the tunnel had been in-

stalled. After the steel and concrete roof had been completed, thus supporting the building, the earth core of the tunnel was removed. On account of the centre supports of these beams, the west portal is made with two openings, but the remainder of the tunnel to the east portal is in one large opening. Under the Carr buildings drifts were run on the lines of the side walls and these walls were constructed of concrete; after which the concrete arch was built in successive 5-foot sections, thus leaving only a small amount of unsupported ground over the tunnel at any one time. The bench or earth core between the side walls was removed after the completion of the roof.

The main tunnel east of the shaft was constructed by running a heading drift 8x10 feet in the centre of the upper part of the tunnel, the average progress of this drift during the last four months of construction being 235 feet per month. The drift was next enlarged to the full width of the tunnel, the roof being supported by posts and crown bars, and the concrete arch was constructed, the haunches of the arch resting upon the rock at the sides. The arch was completed about December 1, 1913.

At about the same date the core under the three buildings had been removed and a power shovel was set up east of the shaft, where the excavation was all in rock. That portion of the excavation between the neat lines of the side walls was blasted out in 10-foot sections and the material loaded onto cars by this shovel, which is operated by compressed air. Excavation for the side walls is being made in short sections so as not to disturb the arch, and the concrete placed immediately. It is expected that this work will be finished about April 1. This method of completing the arch before the lower portion of the tunnel has been excavated is of advantage where rock is encountered which is sufficiently firm to support the skewback of the arch while the bench is being removed. It is usually necessary to put in short sections of the concrete side wall before the bench is excavated if unreliable ground is encountered.



EASTERN ENTRANCE TO TUNNEL

The easterly 75 feet of the tunnel was excavated to the spring line of the arch from the surface down, the arch concrete was placed and the earth backfilled over it. This method was believed to be cheaper than tunneling where there was only a few feet of overburden, and it was also considered impracticable to support ground above the tunnel when the latter was so near the surface.

The estimated cost of excavating and dumping the material was \$5.50 per cubic yard; of the concrete, \$7.00 a cubic yard, exclusive of cement, or \$9.00 including the cement. These figures are subject to some modification by the distribution of various general charges after the completion of the contract.

Municipal Journal

Published Weekly at
50 Union Square (Fourth Ave. and 17th St.), New York
By Municipal Journal and Engineer, Inc.
Telephone, 2805 Stuyvesant, New York
Western Office 608 S. Dearborn Street, Chicago

S. W. HUME, President
J. T. MORRIS, Treas. and Mgr. A. PRESCOTT FOLWELL, Secretary
C. A. DICKENS, Western Manager
A. PRESCOTT FOLWELL, Editor
F. E. PUFFER, Assistant Editor

Subscription Rates

United States and possessions, Mexico, Cuba.....\$3.00 per year
All other countries.....4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at New York, N. Y., under the Act of Congress of March 3, 1879.

CHANGE OF ADDRESS

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributions suitable for this paper either in the form of special articles or of letters discussing municipal matters, are invited and paid for.

Subscribers desiring information concerning municipal matters are requested to call upon MUNICIPAL JOURNAL, which has unusual facilities for furnishing the same, and will do so gladly and without cost.

MARCH 19, 1914.

CONTENTS

Operation of Sewage Disposal Plants (Illustrated). By Francis E. Daniels.....	389
Vincennes Sewerage System.....	392
Street Openings.....	394
Explosions in Sewers. By H. J. Kellogg.....	395
Brooklyn Experimental Sewage Disposal Plant (Illustrated).....	397
Providence Street Railway Tunnel (Illustrated). By John R. Hess.....	399
The Census Bureau.....	401
Large Contract Scandal in Philadelphia.....	401
Manhattan Asphalt Plant.....	402
City Markets in Michigan. By A. Griffen.....	402
Los Angeles City Markets.....	402
Concrete Blocks for Tunnel Lining (Illustrated).....	402
Municipal News (Illustrated).....	405
Legal News—Notes of Recent Decisions.....	411
News of the Societies.....	412
Personals.....	412
New Appliances (Illustrated).....	413
Industrial News.....	415
Contract News.....	417

The Census Bureau.

The present director of the Census Bureau, William J. Harris, has recently issued a circular outlining the work on which the bureau will be engaged during the next few years. He states that "It is the desire and purpose of the present administration of the bureau that its work shall be better known than it has been heretofore, and that the publications presenting the results of that work shall be made more accessible and more serviceable to the American people. It will be the first aim and purpose of the bureau to get out its reports promptly, and it will endeavor at the same time to make these statistics more valuable to the general public as well as to experts and specialists." If the director is able to overcome the difficulties which we realize hamper him but which we believe are by no means insuperable, and carries out this intention, the practical value of the bureau will be immensely increased; and we believe that by reorganization with a view to efficiency and economy such results can be obtained without increasing the cost of operating the bureau.

When we examine the outline of the work proposed, however, we are disappointed to find that little encouragement is held out for believing that any attention will be paid to the physical statistics of cities. Con-

siderable information is promised concerning statistics of cotton and tobacco, religious bodies, electrical industries, Indian and negro populations, the age of farmers, the blind and deaf, and a number of other topics; but concerning the collection of statistics pertaining to highways, fire departments, police departments, public health, sewage and refuse disposal, etc., the director says: "Work on this important branch of statistics of cities will be continued as soon as the bureau has available an adequate force and sufficient funds for this purpose." This is the only topic mentioned concerning which any such statement is made; in other words, these statistics of cities are to be taken up only when sufficient provision has been made for all the other topics. Considering the large percentage of the population of the country which lives in cities, and the vital importance to them of the methods and cost of conducting the civic functions and utilities named, we cannot help but feel that there is a most serious and vital lack of appreciation of the relative importance of the topics considered, in the minds of those who have outlined the work of the bureau.

So important do we consider it that these matters should be studied by competent federal authorities, that we believe those interested in civic affairs should make a combined effort not only to have this study of city statistics given a more prominent place in the work of the Census Bureau, but even to secure the creation of a department of the government, equal in importance to the Department of Agriculture, for the study of these matters and the encouragement and promotion of efficiency in the conduct of municipal affairs. We believe it could be proved that hundreds of millions of dollars are wasted every year in this country by improper and inadequate methods of controlling and operating municipal departments, a large part of which could be eliminated by concentrated intelligent action such as could be stimulated, advised and lead by such a department.

Large Contract Scandal in Philadelphia.

In connection with the creation of a large park, known as League Island Park, the city of Philadelphia, Pa., has during the last four or five years spent \$277,727 for concrete work which was "badly designed, badly built," "can serve no useful purpose, and will probably have to be removed before a satisfactory park can be made." The plans and specifications are open to severe criticism, "the scandalous method of advertising was plainly for the purpose of preventing competitive bids," resulting in the contract being awarded to the only bidder at a high price, and the estimated amounts being doubled during construction, while the "scheme of inspection was of the worst type," the contractor furnishing and paying the inspector.

The above statement is not hastily or carelessly made, but is taken from the report of three consulting engineers of national reputation—Allen Hazen, Richard L. Humphrey and Fred W. Taylor—who were appointed by Morris L. Cooke, the present director of public works of that city. This work, amounting to more than a quarter of a million dollars, was advertised in local papers in fine print, reference to this contract occupying only five lines of an advertisement which began with references to police, fire and patrol stations, was followed by other equally irrelevant matters, and the bids for which were to be received by the city forester, an individual unknown generally to concrete contractors. The only bidder was a state senator.

The investigation of the work done, which consisted for the most part of about two miles of concrete wall and 15,000 square yards of cement walks, was made by openings cut through the wall in seven places, by an

inspection of the surface of each slab of the sidewalk and the removal of several slabs. The most serious defect was in the material used in all the work—a gravel which had not been either screened or washed, and contained a considerable amount of organic mud, pieces of wood, coal and other substances. But hardly less important was the fact that no expansion joints were left in either wall or pavement, that a number of horizontal joints were left in the wall (although this was only 5 feet high) without any apparent effort to secure a proper bond at such points. There are a number of minor points, but the use of the defective material has of course affected the structures throughout, and already they are disintegrating, and the committee making the report believes that the conditions will continue to grow worse.

This scandal was possible largely or wholly because of the secrecy observed. Such underhanded work could be prevented by a law requiring every contract to be advertised under a separate distinctive head and stating the estimated cost of the work, forbidding an increase of more than 20 per cent over the estimate in any item; and possibly requiring that the advertisement occupy at least one inch of space and be published at least one week in advance for each \$50,000 of estimated cost. Turn on the searchlight—public opinion will do the rest.

MANHATTAN ASPHALT PLANT.

March 9, 1914.

Editor Municipal Journal,
50 Union Square, New York City.

Dear Sir:

With much interest I read the description of the largest municipal asphalt plant in the country, "The Municipal Asphalt Plant of Manhattan Borough," as published in your March 5th issue.

I note the statement that "the plans were drawn under the direction of E. P. Goodrich, consulting engineer to the president of the Borough of Manhattan, by J. C. Wolfe, assistant engineer, board of public works, Borough of Manhattan."

While the above statement is true, nothing is said about the fact that I was retained as an expert for the preparation of plans and specifications for this asphalt plant; consequently the plans and specifications were drawn up by me.

Very truly yours,

FRANK KOESTER.

CITY MARKETS IN MICHIGAN.

By A. GRIFFEN.

Detroit and Grand Rapids have had public markets for years, largely wholesale, and a movement toward retail markets is now spreading among the smaller cities, which have two main objects in view—lower cost of living by bringing producer and consumer together, and to build up livelier trading centers, so helping the merchants.

A city retail market was opened in Jackson last fall and so far has proven the most successful one in Michigan. It is centrally located and accessible to all car lines. Stalls are free to sellers. The market is well advertised in local newspapers. It is open all day and Saturday evenings as well. A great variety of stuff is sold, including all farm produce, butter, eggs, chicken and all meats, bread, cake, cookies, canned fruits, pickles, etc.

North Lansing has a street market that has also proven successful and the city of Lansing is now establishing a market with stalls which will be placed under roof, and the city sealer of weights and measures will be also market superintendent. Stalls for single rigs are 10 cents, double rigs or automobiles 20 cents a day, and the minimum charge by the year is \$5. Saginaw also will open a municipal market this year, and Battle Creek, Muskegon, Cadillac, Bay City, Houghton and other cities have plans for city markets.

Kalamazoo's street market has not been entirely successful, the trouble here and elsewhere being with hucksters and traders who buy and sell on or near the market space, taking the middlemen's profit. City officials feel that this profit ought to be divided between the farmer or producer and the ultimate consumer. Another great difficulty met with in establishing municipal markets is the hostile attitude of retail grocers. Jackson grocers have discussed plans of opening a general store near the city market and attempting to kill the market through cut rates, but so far have taken no action.

LOS ANGELES' CITY MARKETS.

The Los Angeles city markets, which were started about the first of July, 1913, have proven a success, according to Frank R. O'Brien, superintendent of the Municipal Market Department. The idea has been to make this department merely self-sustaining, allowing any profits to go to the producers. For this first six months Mr. O'Brien reports as follows:

Rentals for market stalls.....	\$2,407.80
Expenses	2,386.04

Profit	\$21.76
--------------	---------

During this time there were 13,439 peddlers at the various markets, more than half of them being producers or their representatives. About 11,000 tons of food stuffs were sold, worth about \$150,000. Somewhere about 25,000 patrons visited each market in these six months.

The expenses of the market department include an automobile, worth \$625, besides tools, hose, boxes, scales, sheds and comfort stations.

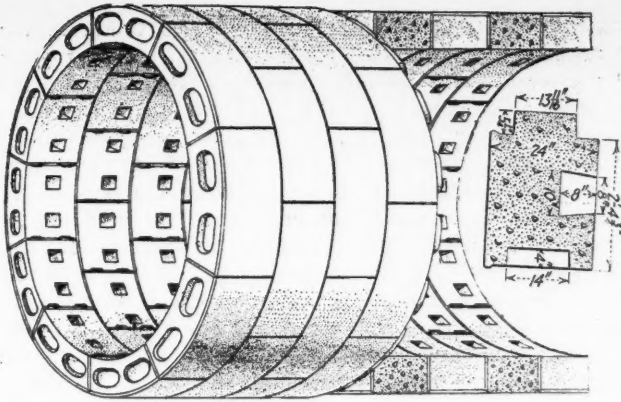
The amount of business at the markets and the continued attendance of producers and consumers is sufficient evidence that the markets are successful and are meeting the approval of a large class of the public. Several new markets are to be installed within the next few months.

CONCRETE BLOCKS FOR TUNNEL LINING

Methods of Using Concrete in Difficult Tunneling for Sewers, Water Works and Other Purposes

During the past few years tunnelling, instead of being adopted as a last resort, has been employed as a common method of constructing sewers, sub-aqueous pipe lines, rapid transit lines, etc. Where the tunnel is through dry rock or stable soil, a lining of concrete deposited in place is common, but where water under pressure or unstable soil is encountered, it is generally necessary to use a shield, with or without compressed air, and to keep the lining of the tunnel completed behind the excavation. For this lining, cast iron segments or steel plates have generally been used, for since it is necessary that the lining be able to receive at once the pressure of the superincumbent earth, and also generally that of the jacks which push the shield forward, concrete deposited in place cannot be used. But rust will cause the deterioration and possibly final destruction of steel plates and even of cast iron, and lining of this material is frequently reinforced with concrete sufficient to sustain the pressure after the metal has been corroded away.

To meet these conditions, two systems have recently been devised for using concrete blocks as a tunnel lining, thus permitting the material to receive pressure immediately and avoiding the preliminary use of iron or steel. One of these processes, which is the invention of John F. O'Rourke of the O'Rourke Engineering Construction Company, of New York, consists of a lining composed of a series of rings, each ring consisting of a



GENERAL AND SECTIONAL VIEW OF O'ROURKE SYSTEM OF BLOCK LINING.

set of voussoir blocks. The blocks in each ring are separated slightly at the joints by adjusting wedges, two driven in each joint; these joints being afterwards filled with cement mortar or other suitable material. Successive rings lock into each other by projections on the rear side of each ring which fit into corresponding recesses or depressions on forward face of the preceding ring; there being two recesses to each block and the blocks in successive rings breaking joints. The recesses are slightly tapering. The projections are slightly greater than the depth of the recesses, so that two successive rings are separated by a clearance of about $1\frac{1}{4}$ inches between their faces. These projections and recesses carry any longitudinal pressure such as would be produced when the shield jacks operate; they also lock successive rings together so that, while a single ring offers very little resistance to distortion by unbalanced earth pressure, two or more rings by interlocking and reinforcing each other's joints possess a considerable strength.

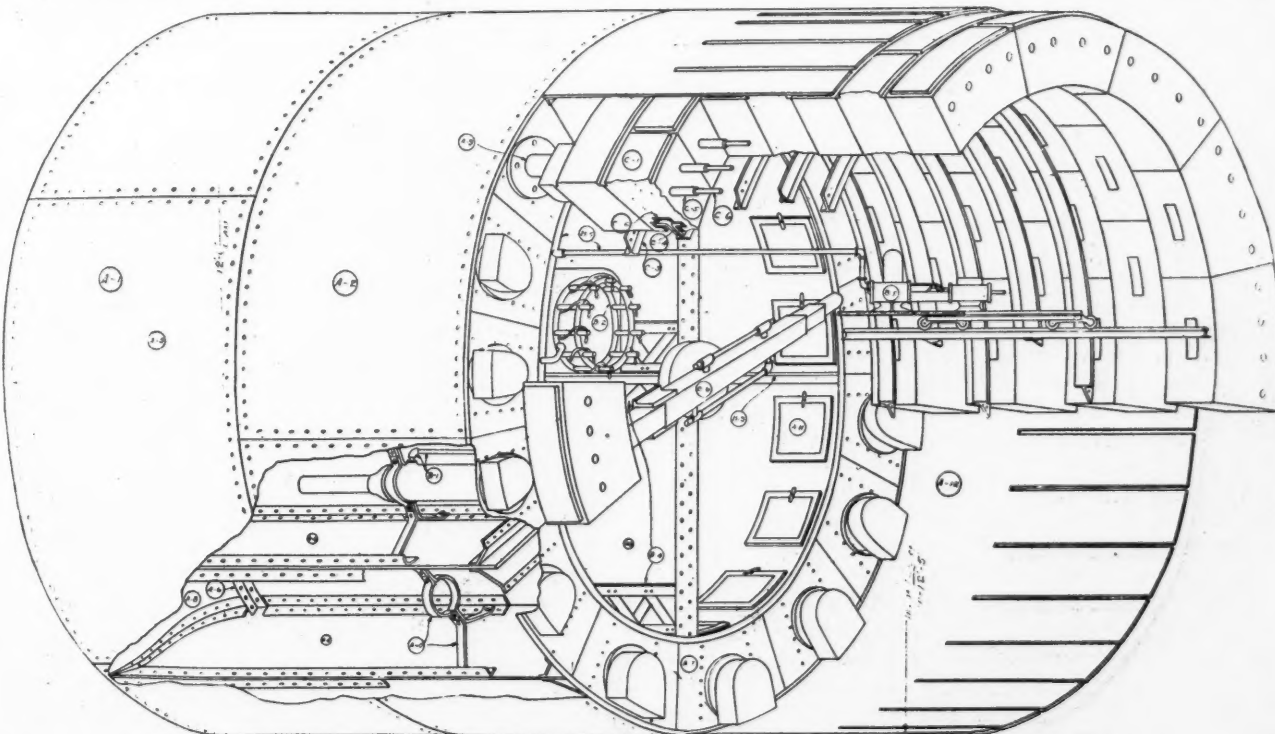
In some cases it may be desirable to construct recesses in both faces of the blocks and use dowels instead of the projection and recess method. The projections and recesses shown in the illustration are oval, but they can of course be round or rectangular if desired.

Around the outer edge of each joint face of each block is a flat, rounded bead extending half an inch above the plain surface. The beads of adjoining blocks come within a quarter of an inch of touching, and as soon as a block is adjusted in place this quarter inch space is made watertight with tarred felt or other gasket to serve temporarily until the joint space of approximately $1\frac{1}{4}$ inches is filled with cement or other material. This inch and a quarter joint space in the ring joints is regulated by wedges, the use of which permits adjusting the shape of the ring to a true circle. A round tunnel would probably be the ordinary construction, but by using blocks of two or more different radii it is apparent that any shape of cross-section can be constructed.

Two recesses are provided in the inner face of each block, each 8 inches deep, 8 inches square on the surface of the block and 10 inches square at the bottom of the recess. These permit the erector which lifts the blocks into place to grip them, and also permits the binding of successive blocks together by clamps.

The other block is that of the Hastings Tunnel Construction Company, also of New York, and in many respects it is quite similar to that just described. In this system also the lining is composed of a series of consecutive rings, each composed of segment blocks, the blocks being joined together with dowels and those in successive rings breaking joints. As each block is placed in position, a water-proof material is applied to the abutting joints, and the dowels are inserted, these consisting of round rods in steel tubes, the length of each equal to the depth of a block. When the block is in place, the tube is first inserted through the hole in the block and pushed on into the corresponding hole in the block of the adjoining ring and to the centre of this block, where it abuts against the end of the similar tube connecting that ring with the preceding one. Dowel rods pass through the tubes, tubes and rods breaking joints with each other. Previous to inserting them in the blocks, both tubes and rods are coated with preservative material to prevent rust and give a tight bond throughout.

These segments are reinforced. By construction of panels on the back of each block recesses or grouting



BROKEN VIEW OF SHIELD AND TUNNEL LINING, HASTINGS TUNNEL SYSTEM.
 DESIGNED BY W. H. HASTINGS, For Cleveland, O., ten-foot water tunnel.

gutters are formed on the outside of all joints. During erection Portland cement grout is delivered by pressure into these grouting gutters along the joints, the grout not only filling the gutters but overflowing and filling in voids between the outside of the lining and the soil or rock. Where the tunnel is to be under internal pressure, the grouting gutters are used to receive reinforcing rods which are placed as the work progresses and before grouting.

A recess is formed in the face of each block, lined with a channel iron which has an opening in each web caused by punching outward a wing-like projection which anchors the channel into the concrete block, permits the rotating erector to grip the block firmly and permits the blocks to be securely fastened to circular steel beams during the construction of the lining. As each ring of blocks is set in place, these circular steel beams, which are made in sections, are fastened in place, and the blocks anchored to them by means of these recesses, and the beams are tied together by a series of spacers, which are bolted or riveted to the beams. For traffic tunnels these circular beams are left permanently in place, but for sewers and the like they are used for construction only, only two or three rings being connected up at any one time.

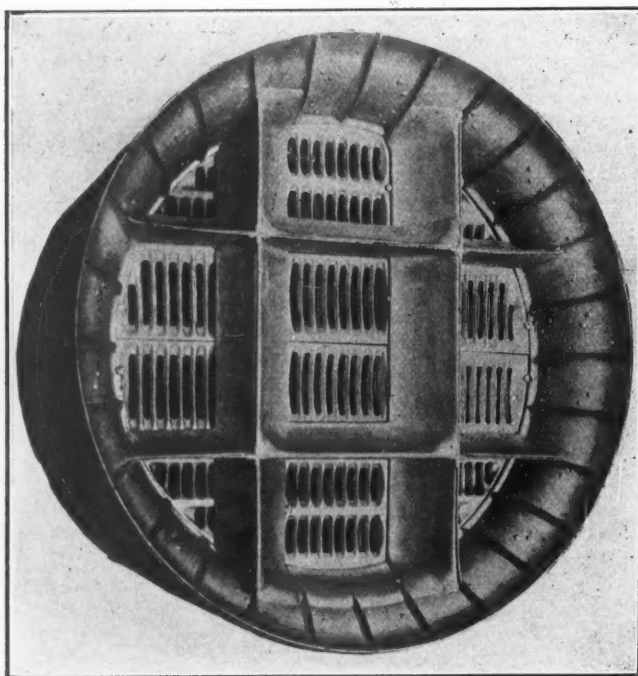
This tunnel also, by the use of specially moulded blocks, can be made horseshoe or any other shape as well as circular. In tunnelling through very wet soil, or wherever more or less constant seepage may occur, a light steel shell can be employed as an outer lining, fastened together by flanges, which flanges would come into the annular grooves or grouting gutters previously referred to.

In connection with this system of lining, where a shield is necessary, the Hastings Company uses a tunnelling shield, which also has been invented by Mr. Hastings, and was used in a 24-foot 9-inch intercepting sewer in Chicago more than 4,000 feet long. This shield consists of two concentric steel plate cylinders, which are connected at one end by a series of radial ogee plates, which form the cutting edge, and at the other end by a series of segmental plates. The cylinders are also united and reinforced by longitudinal stiffeners and transversely by angles and reinforcing plates. Hydraulic

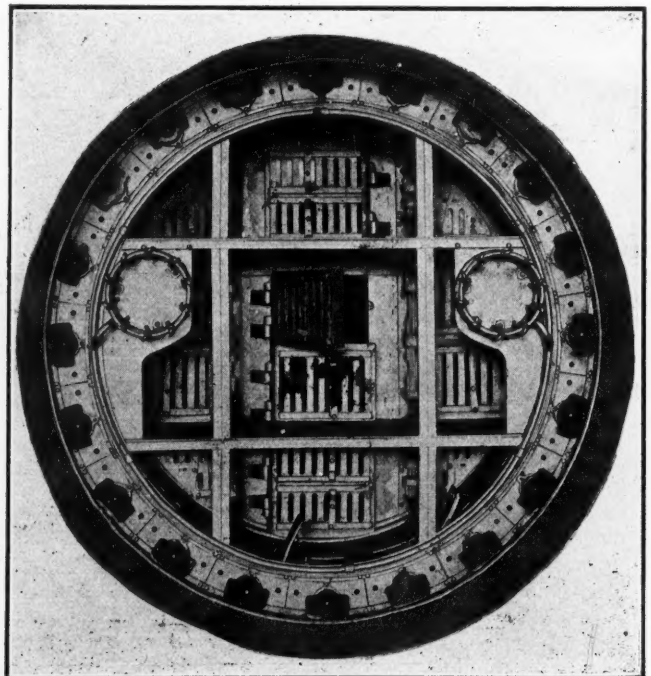
jacks are placed at the rear end of the shield in the space between these two shells, and are held in place by a circumferential reinforcing truss which carries the bearing collars for the forward ends of the jacks, while the rear ends of the jacks are supported by the segmental plates connecting the rear ends of the concentric cylinders. Access to the jacks is gained through doors, a door for each jack being built near the rear end of the inner cylinder. The jacks are of course used for pushing the shield ahead, pressing against the concrete lining blocks. Each jack is fed by an independent water pipe, and each may be worked separately or all at once by means of keys on two circular keyboards, one of which is shown in the illustration just above the block which is being raised to position. The external cylinder extends beyond the internal cylinder and the segmental connecting plates, and the ends of this extension are slotted, forming a flexible apron.

The interior of the shield is divided into several working chambers, depending upon the size of the tunnel, the partitions being built of steel plates. As the shield is forced ahead, the cutting plates at the front of it guide the excavated material to the perforated bulkhead doors, through which, if soft enough, it passes into the working chambers, from where it is shovelled into the transporting cars. The openings in these doors may be closed, or the doors may be open as a whole, depending on the material and the method of removing it. This permits control of the rate at which soft material is removed at any part of the cross-section. Where material is very soft, all openings may be closed as the shield is advanced, thus compressing the material within the belled periphery of the front of the shield so as to be more easily handled. When working in dry clay or other safe material, the doors are left entirely open for the rapid handling of the material.

It is claimed that this method is specially adapted to tunnelling through city streets, where it is desirable not to remove any material whatever outside of the lining, thus preventing any settlement of the ground or building foundations. The apron which is dragged along behind the shield on the outside of the lining prevents any material falling from the roof or sides of the bore before the lining is placed.



FRONT VIEW OF SHIELD, SHOWING CUTTING EDGE.



REAR VIEW OF SHIELD.

The WEEK'S NEWS

Allen County (Ohio) Rejects State Aid—\$20,000,000 Water Works Company to Sell Out—Corporation Stops Municipal Light Project—Well Equipped \$30,000 Fire Station for Providence—Commission Government Changes Asked for N. J. Cities—San Francisco Creates Photography Department—Voting Machines Will Be Used in Flint (Mich.).

ROADS AND PAVEMENTS

Brick Pavements Found Inexpensive.

Binghamton, N. Y.—Computation of the cost of the State and Court street brick pavements to the abutting property owners has been finished by City Clerk F. M. Hopkins and discloses the fact that these two pavements are the cheapest brick pavements ever laid in this city. In the case of both streets, the Binghamton Railway Company, whose tracks run on parts of each, paid one-third of the cost of the paving between tracks and for two feet outside. Binghamton brick was used in the pavement, and as freight charges were practically eliminated this was another strong factor in reducing the expense. It is found that the pavement will cost the abutting property owners in State street \$1.76 per lineal foot. The cost on Court street is still less, the state paying for a width of 16 feet and the railway bearing a considerable portion of the expense. As the city pays one-half of the remainder, the cost to the adjacent property owners on Court street is reduced to \$1.08½ per lineal foot.

Can Use Concrete for Roadbed.

Ogden, Utah.—Convinced through recent investigation in Salt Lake and Ogden that concrete roadbed is best in the paved district of the city, the city board of commissioners has granted the petition of the Ogden Rapid Transit company to use the material on several streets. In granting the petition, the board stated that a careful investigation had recently been made regarding the kind of roadbed that should be used in paved districts and that all members had arrived at the conclusion that there is nothing better than concrete reinforced with steel mesh. This gives the pavement the same expansion and contraction as the steel in the tracks, and thus more perfectly protects the connecting joints between the rails and the asphalt surface on the street at either side of the track.

Council Buys Road Machinery.

Lockport, N. Y.—The Common Council, on the recommendation of the street committee, voted to purchase three new street department machines. It has accepted the proposals of the Austin-Western Road Machinery Company of Harvey, Ill., to furnish for \$215, one No. 1 Standard reversible road scraper, and the offer of the Studebaker Corporation of South Bend, Ind., to provide for \$551.36 one 600-gallon truck platform sprinkler and one Acme street sweeper with one extra broom.

Will Use Tarvia on Sidewalks.

Firthcliffe, N. Y.—A petition to the town board to have Willow avenue sidewalks re-covered with Tarvia this spring is being circulated through Cornwall and Firthcliffe. Last season gravel was laid in that section and Tarvia applied. However, the gravel had not settled sufficiently to produce result entirely satisfactory. The plan now afoot is to use the old sidewalks as a foundation upon which to construct a new combination of gravel and Tarvia.

Spurn State Aid.

Lima, Ohio.—Allen county is one of three Ohio counties from a total of 88 that still refuses to accept state aid. The state highway department has urged upon the county the acceptance of such assistance which would amount to \$30,000. Under the Hite act, levying one-half of one mill on all property for the improvement of roads, Allen county will contribute this year about \$40,000 in addition to what has already been accumulated. The reason for spurning state aid is to be found, according to local officials, in the burdensome conditions under which money raised in the

county is returned, the law requiring those interested in the roads, the county, town and property owners immediately affected by the improvements, to contribute an amount equal to that furnished by the state. The state pays 50 per cent of the total amount, the county 25, the township 15 and the property owners 10. The county commissioners believe that acceptance of state aid would compel them to spend all the money on certain roads, leaving nothing for other roads needed by farmers.

Modern Paving in Jacksonville, Fla.

Jacksonville, Fla.—Work is progressing rapidly in the modern paving that is now being laid in several sections of the city, these new municipal improvements including brick on sand, brick on a concrete base, dollarway and asphaltic concrete, both of the last forms of paving being on a concrete base of four, five or six inches. Commissioner of Public Works L. D. Smoot is devoting much of his time to personally furthering and superintending this important work that means so much to the city's best interests and Superintendent Ballenger has succeeded in so organizing and training his different forces as to add much to the efficiency of this particular department. Modern paving is therefore progressing in a way that means tremendous improvement for the streets of Jacksonville in the immediate future.

Road Supervisors Organize.

York, Pa.—An organization of township road supervisors of York county, provided for under an act of the state legislature approved May 8, 1913, has been effected at a recent meeting in the court house. The meeting was attended by 80 road supervisors of the various townships in the county and a number of other persons interested in the good road work. Joseph W. Hunter, first deputy highway commissioner, and chief of the bureau of township highways; Willis A. Wited, bridge engineer of the state highway department, and C. W. Erisman, assistant engineer of the bureau of township highways, were present at the meeting and delivered addresses.

Would Free Toll Bridges.

Trenton, N. J.—Citizens in the towns of this state along the Delaware River are petitioning the Appropriations Committee of the Legislature with requests that the committee include in the appropriation bill this year an item of \$100,000 to be added to a similar sum appropriated last year by the State of Pennsylvania, to acquire the toll bridges spanning the Delaware and throwing them open to free traffic. Assemblyman O. C. Holcombe, of Lambertville, who has been working to free the toll bridges ever since he has been in the Legislature, is using his efforts to get the appropriation. In view of the present stringency in the State Treasury, it is not known what view the Appropriations Committee will take as to this appropriation.

May Use Oil Shale for Pavements.

Grand Junction, Col.—Mesa county, according to a report, has vast beds of oil-bearing shale which may possibly be used as material for road surfacing. Steps may be taken soon to make a test of the shale in road construction. Many practical road builders here, though admitting that the proposition was new to them, were favorably impressed as to its possibilities.

Constructing Gravel Road.

Stratford, Conn.—Work on the new state highway from Paradise Green to Lower Shelton will be started in earnest within a few days. The road was laid out by the State engineers last autumn and work was started upon it at that time but owing to the severe cold and deep snow the work

has been held up for the past six weeks. The new road will be constructed of gravel. A few men have been working on the road all winter cutting down some of the worst grades and filling in a few of the low spots so that now practically all that remains to be done is to scrape off the top and lay on the gravel. After this has been done the road will be well oiled and ready for travel again.

SEWERAGE AND SANITATION

Complete Syphon to Carry Sewage.

Ithaca, N. Y.—A syphon for carrying the sewage from the West Hill section under the Inlet to the mains of the system on this side of the stream has just been completed under the direction of Superintendent H. L. Stewart, and is now in operation. The original syphon under the Inlet was placed there when the city sewerage system was built in 1876, the two eight-inch mains crossing on the bottom of the channel at that time seven feet deep. When the dredging for the barge canal was started the old syphon was torn out and the channel deepened to twelve feet. Last fall when the water was low, a five-foot "ditch" across the bottom of the Inlet at Mill street, giving a total depth of seventeen feet, was dug, and in this was placed one eight-inch main, sloping up on each side to a concrete manhole, the bottom of which is several feet below the surface of the water in the channel. An eight-inch main will take care of the sewage from a population of approximately 5,000 people, and the use of one pipe instead of two was considered better because the flow would be faster, the syphon having more of a tendency to clean itself. In case the syphon does become clogged, however, in the manhole on the west side of the inlet there are valves by which the sewage can be shut off temporarily and a four-inch high pressure stream from the city water mains can be forced into the syphon, exerting a force sufficient to blow out any obstructions.

Will Prohibit River Pollution.

San Antonio, Tex.—The city ordinance making it an offense to throw any kind of refuse into the San Antonio River will be strictly enforced in the future. This proposition has been discussed in City Council, and Police Chief Lancaster has been instructed to strictly enforce the ordinance prohibiting the pollution of the river. Complaints have been made to several of the Aldermen about some of the manufacturing concerns on the banks of the river which have thrown oil and other refuse into the stream. Alderman Chapa has had several such complaints made to him. Mayor Brown gave word to the police department to arrest any party who was caught polluting the river in any manner.

Move Against Sewerage Company.

Burlington, N. J.—After permitting the Burlington Sewerage Company for 13 years to dump effluent from its disposal plant west of the city into the municipal drainage ditches, Common Council has ordered such drainage stopped. It condemned the conditions at the disposal plant as offensive and a health menace, and called upon the State Board of Health to take immediate steps to remedy the situation.

WATER SUPPLY

Contention Over Meter Installation.

Schenectady, N. Y.—The elimination from the budget of \$15,000, asked by the Water Bureau for meters, is considered by many in close touch with the affairs of that department a serious error. It was learned that this item had been the bone of contention for some time between the Board of Estimate and Apportionment and the water department heads. The Estimate Board and several of the council have taken the attitude that the public as a whole is opposed to the installation of meters. Most of those who object, however, are unfamiliar with the actual conditions which make the installation of meters throughout the city a necessity and a matter of greater economy than the temporary saving

effected by cutting the budget item, according to Superintendent McWilliams of the water bureau. Mr. McWilliams said:

Engineering practice has proven it best to meter a city. A mass of statistics from progressive cities all over the country show clearly the actual saving effected by their installation. The present daily gallonage per capita in this city is 123. Under a meter system where unnecessary waste would be eliminated, this amount should be more than cut in half. The saving is very apparent when the fact is considered that the city is now paying the Schenectady Illuminating Co. \$6.50 per million gallons for current used in pumping at Rotterdam. When the new sewage pumping station at the foot of Ferry street is put in commission the waste gallonage will have to be again pumped, this time to the sewage disposal plant, making a double avoidable loss to be borne by the city.

Following the council meeting Mr. McWilliams conferred with the aldermen, explaining in detail his views on the matter. As a result, he was sanguine that a resolution would be introduced at the next meeting providing \$5,000 for metering the business district.

Broken Water Main Wrecks Dwelling.

Springfield, Mass.—The accompanying picture shows havoc wrought by a broken water main in Springfield, early on the morning of March 1. The first warning of trouble was given by a policeman who saw a great geyser of water come bubbling up in the front yard of the dwelling house, and within half an hour afterwards the water had eaten away so much of the ground beneath the building's foundations that the entire front wall of the house collapsed. All the inhabitants had ample warning



HOUSE UNDERMINED BY WATER FROM BROKEN MAIN.

and made their way out in safety. As can be seen in the picture the house, broken in two at about its middle, reveals an usual midnight scene in a house standing in the poorer section of the city. A quick response by the water department had the trouble stopped in a comparatively short time and before the damage had spread to other yards and buildings. The exact cause of the break has been causing a great deal of interesting conjecture. The slight earthquake which was recently noticeable throughout New England and along the Atlantic seaboard has been considered as a possible starting point of the trouble. It was suggested that the recent abnormally low barometric

pressure in the East might have been a factor, but that theory was rejected. The main was not frozen at the time of its breaking and some flaw in the pipe seems the only logical explanation left. The damage resulting from the break and its ensuing geyser has been set at \$10,000.

Plan Pumping Station and Filtration Plant.

Saginaw, Mich.—On April 27, this city will vote on a bond issue of \$700,000 to provide for the construction of a consolidated pumping station and filtration plant. The city is in urgent need of this improvement and has concentrated all its energies on securing a more reliable water supply than it has at present. The outlook of the proposed improvement as a sound financial investment is encouraging, since in ten years the revenue of the existing water system has doubled, the bonded indebtedness has been reduced and the number of consumers increased by more than 100 per cent.

Will Sell Water Plants.

Pittsburgh, Pa.—Application has been made in the United States District Court here by J. M. Shields, attorney for the receivers of the American Water Works and Guarantee Company, for an order to sell the company's property. The American Company is a \$20,000,000 corporation and owns water plants in a number of western and southern cities. It was placed in the hands of receivers soon after the First-Second National Bank of Pittsburgh was closed last July.

New Reservoir Completed.

Claremont, N. H.—The new reservoir constructed at a cost of \$75,000 is now completed and in operation. It has been filled with 27,000,000 gallons of water and has a capacity of 34,000,000 gallons. Its capacity is therefore greater than that of the three other reservoirs combined. The new reservoir will not entirely eliminate the use of the pumping station, as water was supplied from wells for 181 days last year, the total number of gallons pumped having been 65,754,560.

Stop Waste by Inspection.

Toledo, Ohio.—Mayor Keller, Service Director Boardman and Waterworks Superintendent Goodwillie have begun a campaign against the useless waste of water by public and quasi-public institutions. They started a trip of inspection, going first to the Children's Home, where they found a large number of leaking joints and some faucets continually running. Such institutions are sold water at the flat rate given to manufacturing concerns. Other public buildings and institutions are to be inspected later, with a view to cutting off as much waste as possible. Superintendent Goodwillie estimates the water now being wasted costs the city several thousand dollars yearly to pump.

Meters Paid Off on Rental Basis.

Galveston, Tex.—The board of city commissioners has adopted an ordinance providing for the discontinuance of meter rents after the sum of \$15 has been paid. The meter then becomes the property of the citizen and he is requested to keep it properly repaired.

Report Chemical Analysis of Pasadena's Water.

Pasadena, Cal.—Pasadena's water supply in the Arroyo carries thirteen parts of calcium carbonate to the 100,000 of water and a trifle over fourteen parts to the same proportion in the reservoirs. This fact has been determined by City Chemist F. E. Marks, who has submitted to the city board an analysis of hardness, based upon three samples, one from the gravity flow, one from the South Pasadena reservoir and one from the Mountain street reservoir. This hardness test shows that the water carries silica, oxides of iron and aluminum, calcium, magnesia and sulphates. This is the first test made covering the hardness of the water and is of value in giving manufacturers an idea of what uses they can put the water to. In exact figures the hardness of the gravity water is thirteen parts, of the South Pasadena reservoir water, 14.1 parts, and of the Mountain street reservoir water, 14.11 parts.

STREET LIGHTING AND POWER

Offer Cheaper Service to Have Franchise Extended.

Pascagoula, Miss.—The Pascagoula Street Railway and Power Company, which ten years ago bought the municipal light and water plant of Pascagoula and obtained a 25-year franchise, has applied to the Board of Mayor and Aldermen for an extension of its franchise to 1924. It offered as an inducement to lower the price of electric lighting to consumers 25 per cent; to furnish the city with 120 street lamps instead of the 72 that the city has under the present contract; to keep its water works up to the standard, and to have always 100 feet of water in its standpipe.

City Will Purchase Current.

Troy, Ala.—Troy is now using the electric current generated at the Pea river dam, 30 miles south from here. The work of constructing this immense dam and building the line in to Troy has taken about two years. The city has a contract with the Pea River Power company to furnish electricity to the city and all the industrial enterprises that desire it. The rate of the new current will be much cheaper than that generated by the city.

Will Install Arc Lamps.

Provo, Utah.—Within a few months Provo will have a modern street lighting system. An agreement has just been entered into between the city and the Utah Power & Light Company, under which the power company agrees to install 50 up-to-date arc lamps on the main streets of the town. These new arc lamps will be suspended above the center of the street intersections. One of the provisions which the city officials included in the agreement with the power company was a clause requiring the company to remove all pole lines on the streets to be lighted from the center of the street to the curb line. This will enable the city officials to make some desirable improvements in the roadbed on the streets in question.

Want Poles and Wires Removed.

Brooklyn, N. Y.—Senator Duhamel, accompanied by a large delegation of citizens from the 30th Ward, called on Mayor Mitchel last Monday and asked if the city would not take some action to bring about the dissolution of the temporary injunction granted the Edison Illuminating Company nearly two years ago, restraining the city authorities from removing the electric poles and wires in the ward. The Bureau of Franchises of the Board of Estimate two years ago discovered that the Edison company was furnishing electric light in that section of Brooklyn without a franchise. The company was instructed either to apply for a franchise or take down its poles and wires. If this order was not complied with, the city indicated that it would assume the responsibility for removing them. DeLancey Nicoll was appointed a referee by the Supreme Court to pass upon the facts. It seems that Mr. Nicoll has granted the company fifteen adjournments on trivial grounds, according to the delegation of citizens. They told Mayor Mitchel that they wanted action in the matter.

Restrained from Building Municipal Plant.

Millville, N. J.—In an opinion handed down by the Court of Errors and Appeals, stockholders in the Millville Electric Light Company have won their suit against the city of Millville, restraining the city from issuing bonds to erect a municipal electric plant. The city won the case in the lower courts, and the court of last resort reversed the decision.

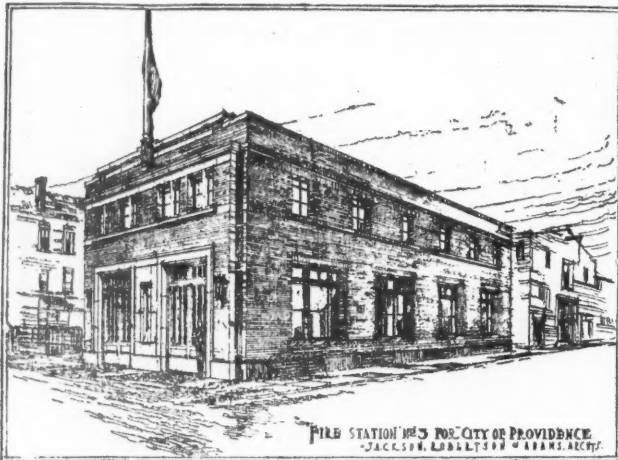
Vote on Boulevard Light System.

Sterling, Ill.—Sterling voters are voting on the approval of the ordinance recently passed by the City Council, authorizing the establishment of a system of boulevard lights. This system will cover the business district of the city. It will not increase taxation. The cost of installation will be paid by property owners along the proposed system, and the cost of maintenance, which will be only slightly higher than the present system of arc lights, will be borne by the city.

FIRE AND POLICE

Fire Station to Have Individual Compartments.

Providence, R. I.—This city will begin the construction of a \$30,000 fire station to be located at the corner of Pond and Franklin streets. It will be built on a lot 49 ft. by 54 ft., and since the structure is to be 41 ft. by 51 ft., there will be open spaces on all four sides. There will be entrances on three sides, the Pond street side being excepted. Room for two pieces of apparatus has been provided. On the first floor in the rear of the apparatus room space is allotted for a lounging room, a visitors' room and toilets. The architects have planned a novel ar-



NEW FIRE STATION FOR PROVIDENCE.

range for the second or dormitory floor. At the front will be a captain's and lieutenant's room. Between these two rooms will be quarters for the drivers. The main dormitory will have accommodations for the eight regular and two substitute men of the two companies. This dormitory, instead of being one large general sleeping room, will be divided into ten compartments with the fronts entirely open. Each compartment will be well ventilated and will have a window. The basement will contain the heating apparatus, a workshop and racks upon which to dry the hose.

Estimating Cost of Gamewell System.

Holyoke, Mass.—Work on laying out maps so that an idea may be given to the local authorities regarding the new police signal system has been started by a representative of the Gamewell Telegraph signal system. He has arranged one map with four circuits which will provide for 100 police patrol signal boxes, thereby anticipating the growth of Holyoke for a long time, the present system having only 43 boxes in operation. The cost of the system to Holyoke is not known at the present time, but it is estimated roughly that a Gamewell system of four circuits with provision for 100 boxes could be installed with overhead wires for \$6,000 or \$8,000. The cost of the combination fire and police signal system with overhead wiring would be about \$10,000 or \$12,000, and the ideal system of a combination fire and police signal system with underground wiring would cost not more than \$20,000.

Telephone System Installed.

Portsmouth, Va.—Under the new telephone system, patrolmen will be required to call in to the central station hourly, from a different box each time. At night hourly calls must be made until 2.56 A. M. A further requirement under the new schedule makes it incumbent upon the policemen on post to report by 'phone from the street boxes just before they leave their posts, preparatory to going off duty. In no instance will a policeman be able to report finally before leaving his post, more than sixteen minutes prior to the stipulated time for the men to come off duty in the morning.

State-Wide Campaign to Cut Fire Risks.

Saint Paul, Minn.—State Fire Marshal C. E. Keller has begun a state-wide campaign to lessen fire risks in theaters, schools, public assembly halls and hotels. The last legislature enacted a law reorganizing the department and giving the fire marshal many additional powers, such as the right of inspection and condemnation of buildings throughout the state. Because of lack of funds the department was unable to do much of this work until March 1, when the insurance company taxes for its support began to come in. Several deputies have been assigned to this inspection work and already a number of moving picture theaters have been visited. Ordinances have been prepared for the local regulation of theaters and also providing for local inspection of buildings, and giving town, city and village authorities the power to order corrected any dangerous conditions which may be found.

Changes in Pension System.

Colorado Springs, Col.—An amendment to the firemen's relief ordinance, making the monthly assessment on each member of the fire department 1 per cent. of his salary, rather than 75 cents flat, has been passed at an adjourned meeting. Commissioner Johnson of the department of public safety introduced the amendment, saying the new plan would equalize the assessments and further protect the fund. The amendment also makes slight changes in qualifications for benefits under the pension system. At present the ordinance provides that any person who has served 20 years, or who is 60 years old, shall be retired on a pension upon application. Commissioner Johnson's amendment makes it discretionary with the fireman whether he shall retire after 20 years' service. It also makes it necessary for a man to serve 15 years in the department before he can be retired, even though he has reached the age of 60.

Two Days Off a Month for Police.

Woonsocket, R. I.—Gov. Pothie has signed substitute "A" of an act in amendment of chapter 716 of the public laws, passed at the January session, 1911, entitled "An Act Allowing One Day Off in Each Calendar Month to Policemen in the Cities of Providence, Pawtucket, Woonsocket, Newport, Central Falls and Cranston," as amended by chapter 975 of the public laws, passed at the January session, 1913. The committee on judiciary recommended passage in concurrence and the senate adopted the recommendation. The amendment provides that the police shall have two days off a month and not less than 24 days a year, in addition to the regular vacations, and subject to the approval of the city council.

Reading Will Have Paid Fire Department.

Reading, Pa.—It has been definitely decided that Reading's volunteer fire department will go out of service on June 1, when a paid department, to cost \$113,000 a year, will step in. The new fire chief is to get \$2,000 and two assistants \$1,500 each.

MOTOR VEHICLES

Exhibit Motor Pumping Engine.

Waxahachie, Tex. — An exhibition of the new motor pumping engine, purchased from the American La France Company of Elmira, N. Y., has been made in Ft. Worth last week. During the test a stream of water was thrown to a height of over 190 feet at the rate of 750 gallons per minute. Mayor Prince, Chief Davenport and other prominent officials were present at the trial.

Auto Truck Received.

Lynchburg, Va.—The new automobile fire truck has been received with great enthusiasm by the officials and people

of Lynchburg. The motor is a six-cylinder, one hundred and twenty horsepower machine, weighing twenty-two thousand pounds, and it cost nearly eleven hundred dollars. It is fitted with the very latest fire fighting equipment, and will therefore add materially to the efficiency of the local department. The eighty-foot extension ladder can be raised by one man, it being hoisted by two strong springs. In addition to the extension ladder, the truck carries 13 ladders varying from 36 to 6 feet. There are ten eighteen-foot pikes and twenty scaling belts on the truck. Four rubber buckets are fastened to the motor in case of emergency. A demonstration will be made when the Sea-grave Company's representative arrives.

GOVERNMENT AND FINANCE

Changes Recommended in Commission Government.

Trenton, N. J.—Eighteen commissioners named by Governor Fielder last year to investigate the operation of commission government in New Jersey have made their report, finding generally that the Walsh act has been so satisfactory that no important changes in it are demanded at the hands of the Legislature. The changes recommended in the report are as follows:

The number of signers for recall, initiative and referendum petitions shall be increased from 15 to 25 per cent of the legal voters of the municipality in which the operation of these features of the law is sought. The commission says it does not suggest this change to hamper use of the initiative, referendum and recall, but rather to bring about an honest expression by the voters. The commission believes that the application of the initiative and recall to appropriations is wrong, and suggests that the law be amended so that municipalities operating under the law may be unrestricted in providing funds to meet expenses of administration. Other recommendations are that the terms of city officers appointed by commissioners be made to run concurrent with the terms of the commissioners, so that each commission shall have the selection of the heads of various departments under its administration; that the commissioners have power to fix the number of members of boards of assessors as it deems advisable; that signatures for recall petitions shall be secured within two months next preceding the date of filing the petition with the city clerk; that commissioners have the power to name a commissioner as the head of a department without extra pay.

The report was written by Charles E. Bird, city counselor of Trenton, who drafted most of the bills which accompany it.

Plan for Commission Government.

Manitowoc, Wis.—The movement for a commission form of government has been launched at a mass meeting arranged by a committee of 100. At present it is planned to hold the election two weeks after the regular spring election. Petitions for the special election are now being circulated. A campaign of education will be carried on in the newspapers and speakers from cities in which the commission plan has been tried will be secured to talk at several mass meetings now being planned. A campaign to place LaSalle, Mich., under the commission form of government has begun with the circulation of petitions asking the county judge to call a special election to give the citizens an opportunity to vote upon the question. It is proposed to have the election held early in the summer. It is said that the petitions are being generally signed and that within a few days the required number of signatures will have been obtained. Should the city of LaSalle adopt the commission plan, it would mean that at the next mayoralty election, which comes in April, 1915, the citizens would select a mayor and four commissioners.

Bond Election Declared Valid.

Wappingers Falls, N. Y.—With the decision handed down by Justice Tompkins at the Carmel Court House, the advocates of the sewer and water systems for the village of Wappingers Falls will soon realize the benefits to be derived from these modern improvements which they have urged and worked for so long. The opinion of Judge Tomp-

kins affirms the validity of the \$150,000 bond issue which was authorized at a taxpayers' election on November 18, 1913. The justice finds that, while the improvements are expensive, they are needed for the development of the village and that they were regularly ordered.

Commission Government Rejected.

Grand Forks, N. D.—The commission form of government has been beaten a second time at the polls. The vote was very small, being 298 for and 825 against. About four years ago the commission form was voted down.

STREET CLEANING AND REFUSE DISPOSAL

Purchase Flusher to Cut Expenses.

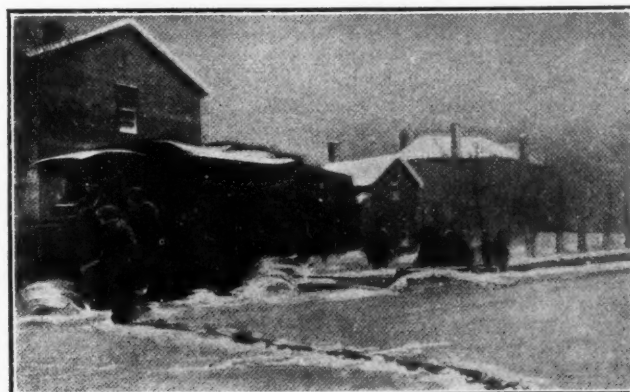
Ithaca, N. Y.—Half the cost to the Department of Public Works set down against keeping the streets clean and dustless during the coming months will, it is said, be cut from the expense sheet by the addition to the department's equipment of a new 600-gallon flusher which has been ordered from the Studebaker Company of South Bend, Ind. The new machine will take the place of the old sprinkling carts and street brushes. Superintendent Martin Conlon estimates that where the city spent \$190 a month in former years in keeping streets clean, an appropriation for \$90 will now do the same work.

Wooden Ash Barrel Must Go.

Billings, Mont.—The wooden ash barrel is the object of Fire Chief Kennedy's latest attack. For the benefit of those who do not know that there is a stringent ordinance which forbids the keeping of ashes in anything but metal receptacles, Chief Kennedy has announced that a regular patrol of every alley in the city is to be inaugurated, that wooden ash barrels will be destroyed by the patrolmen and that the owners may have to pay a fine. "Ten per cent of all the fires of 1912 and 1913 were caused by live coals igniting the wood ash barrels in which they were placed," said the fire chief. "The fire department intends to reduce the number of blazes in 1914 to a minimum, and this is one way of going about it."

Street Cleared by Snowplow.

Akron, Ohio.—During a recent snowstorm here, which completely stopped car traffic for three days, a truck from the Goodrich factory, equipped with Wireless Tires, was



AUTO TRUCK PULLING SNOW PLOW.

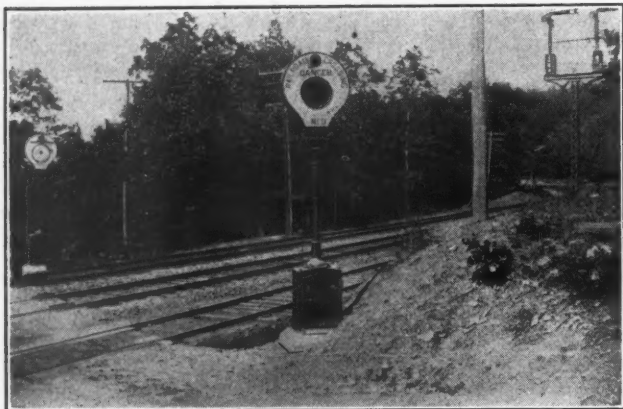
called into service. A snowplow was hitched to it and towed through the most important streets of the city. These streets were soon sufficiently well cleared of snow to admit of necessary travel.

RAPID TRANSIT

Railroad Installs Automatic Block Signals.

Newark, N. J.—The Lehigh Valley Railroad Company has begun the installation of block signals at important grade crossings. Such towns as Crawford, South Plainfield and Metuchen have already been benefited by these signals. More have been ordered for Newark and its vicinity,

and are being erected as fast as possible. This device is familiarly known as the "banjo" signal. It is placed at right angles to the highway crossing. When the train approaches it operates the signal automatically so as to show a red disk (at night this is lighted) and rings a gong that



Courtesy Newark (N. J.) Evening News.

BLOCK SIGNALS AT GRADE CROSSING.

can be distinctly heard for a distance of 500 yards. When the train has passed the signal swings back, showing a white disk.

MISCELLANEOUS

Create Photography Department.

San Francisco, Cal.—A resolution to create a department of photography, and place G. F. Kelly in charge of it at \$3,000 a year, has been adopted by the Board of Public Works by a vote of two to one. By the resolution Kelly's appointment is to take effect July 1 and the Board of Supervisors is requested to allow the department \$16,000 in the budget for the next fiscal year. This sum provides for the chief's salary of \$3,000, one assistant at \$1,800, two assistants at \$1,200 each, two at \$1,020 each, one at \$900 and \$5,860 for supplies.

Urge Bill for Municipal Control.

Des Moines, Ia.—A municipal ownership bill, that provides for municipal control and operation of practically all public service utilities as well as the ownership thereof will be introduced before the next state legislature by business men of Des Moines. It has been announced that a municipal ownership league is being formed to stir up interest in the bill and present it to the assembly. The proposed statute is more in the interest of creating a law whereby municipal ownership of telephone systems in Iowa will be possible. But it will include street railways, warehouses, cold storage plants, transfer companies and all other businesses of a public service nature. It will also strengthen the law enabling cities to buy waterworks and gas and electric lighting systems.

Voting Machines to Be Used at Election.

Flint, Mich.—City Clerk Newcombe has received word from the Triumph Voting Machine company of Jamestown, N. Y., that the voting machines to be used here in the spring election will be shipped from the factory on March 17. They will arrive here in time to be set up so that instructions in their use may be given to the election inspectors who will instruct the voters. An additional machine, aside from the 16 purchased, will be shipped. The extra machine will be placed in the Sixth ward precinct at the Central fire station, where there are more than 1,000 voters registered.

City Will Adopt New Accounting System.

Houston, Tex.—Mayor Campbell will shortly enter into a contract with Rankin & Schwartz, public accountants, whereby a reorganization in system and methods of book-keeping at the City Hall will be made. It is proposed to

have a reorganization of the departmental arrangements of the city's business, a systematizing of methods in each department and the evolving of a modern and approved system of accounting for all the departments. In making arrangements in some departments, certain considerations may be made. Transfer of certain work may be necessary in order to prevent duplication. All changes will be made with the object in view of reducing all unnecessary expense and of improving business methods at the City Hall.

Apportion 8,000 Trees.

Denver, Colo.—Crowds of applicants for a share in the 5,000 elms and 3,000 maples to be apportioned by the city to Denver property owners have filled the office of the commissioner of property last week. Under the agreement a number of trees proportionate to the size of the property of the applicant are allotted to him. They are then delivered by the city and planted by the owner along his street frontage. Heretofore many of the allotted trees have died through improper care. This year those who receive trees will be pledged to attend to them properly, and instruction in the method of setting them out will be given to insure their successful growth.

City Makes Profit on Waste Paper.

Duluth, Minn.—Waste paper is no longer wasted at the City Hall. Mayor Prince has purchased a paper-baling machine, which cost \$35, and has had it installed in the basement of the City Hall. It bids fair to pay for itself within a comparatively short time. All the paper from the City Hall, the police station and the municipal court is now brought to the basement of the City Hall instead of being thrown into the furnace or hauled to the dump. The machine compresses it into bales. In this shape it is bought by a local concern at the rate of 27 cents per hundred pounds.

Bidder Sues Philadelphia.

Philadelphia, Pa.—E. F. Fonder, an unsuccessful bidder for the construction of Pier 38, South Wharves, has begun injunction proceedings in Common Pleas Court No. 5 to restrain Mayor Blankenburg and Director Norris from carrying into effect a contract awarded to Snare & Triest for the construction of the pier and bulkhead shed. Fonder contends that Snare & Triest's bid was \$245,200, while his was \$234,509. The successful contractor placed a time limit for the completion of the work. Fonder failed to do this, but contends that this omission could have been rectified, and that being the lowest responsible bidder he should have been awarded the contract.

Consolidate Departments.

Beverly, Mass.—Mayor H. A. MacDonald has attached his signature to the ordinance passed by the City Council providing for the consolidation of the street, water and park departments. The ordinance goes into effect in thirty days.

Commission Issues Book on City Planning.

Newark, N. J.—An attractive book on city planning in Newark has just been issued by the City Plan Commission. It contains, besides an introduction telling why Newark is a good place to live in, ten chapters, covering 163 pages, dealing with such phases of city planning as municipal decorations, width and arrangement of streets, functions of good city plan and trolley transportation. The volume abounds in illustrations of proposed improvements, maps and statistical charts.

Mayor Distributes Pamphlets to Enlist People's Aid.

Philadelphia, Pa.—Mayor Blankenburg, through the police, has distributed 100,000 pamphlets containing "A Message from the Mayor to the Citizens of Philadelphia." By this unique method the mayor hopes to arouse public interest in his efforts to secure harmonious relations with the councils and to prevent the passage of "graft" legislation. The recent enactment of the municipal court appropriations bill embracing extravagant provisions has caused the mayor to appeal directly to the people.

LEGAL NEWS**A Summary and Notes of Recent Decisions—
Rulings of Interest to Municipalities****Licenses—Occupation Tax.**

Ridgeway v. City of Bessemer.—The tax imposed by an ordinance, licensing various "businesses, professions, or vocations" carried on in the city, in imposing a license tax on dairymen, "20 cows or less, \$1 each cow, all over 50 cents each," is a license tax on the occupation of a dairymen doing business within the city, and not a property tax.—Court of Appeals of Alabama, 64 S. R., 189.

Police Officers—Bonds.

Looney v. City of Sioux City.—Failure of the superintendent of a city police department to require the usual bond of a police officer before assigning him to duty was an omission to perform a governmental function, and hence the city was not liable to a "private person unlawfully injured by the policeman in the discharge of his duty."—Supreme Court of Iowa, 145 N. W. R., 287.

Town Meeting—Acceptance of Treasurer's Report.

Town of St. George v. Tilley.—Vote of a town meeting "to accept and adopt the report" of the town treasurer, on which official action had not been taken by the auditors, did not bind the town as a ratification or settlement; the report not being in accordance with all the material facts within the knowledge of the treasurer, of which the voters were ignorant.—Supreme Court of Vermont, 89 A. R., 474.

Public Work—Plans and Specifications.

Kuhn v. City of Buffalo et al.—Where the plans and specifications for furnishing and installing a system of mechanical refrigeration in a municipal market were ambiguous and indefinite and did not show whether a vertical or horizontal pump was required, they were illegal, and a contract based thereon was subject to be annulled in a taxpayer's action, independent of fraud, collusion, or favoritism.—New York Supreme Court, 145 N. Y. S., 910.

Water Company—Interest of Complainants.

Meyer et al. v. Somerville Water Co.—Riparian owners whose water rights are not yet threatened by a water company cannot enjoin the water company from laying its mains, etc., under a contract between it and several other water companies for furnishing water to a town, on the ground that the contract and the laying of the water mains through the town was ultra vires, since that does not concern complainants.—Court of Chancery of New Jersey, 89 A. R., 545.

Assessments—Action Before Justice of Peace.

City of St. Marys v. Locke et al.—In view of the powers delegated to it by sections Code 1906, and an ordinance duly passed by it providing for the levying of special assessments for street improvement, and the collection thereof by suit "before a competent court," a city may bring a personal action therefor against the property owner, before a justice of the peace; the amount thereof being within his jurisdiction.—Supreme Court of Appeals of West Virginia, 80 S. E. R., 841.

Regulation of Navigation Through Bridges—Ordinances.

Canada Atlantic Transit Co. et al. v. City of Chicago.—An ordinance of the city of Chicago, requiring all vessels when passing any bridge in the Chicago river to move at a rate of speed of not less than two miles an hour, and all vessels of 1,200 tons gross burden or more when moving through or between bridges in certain parts of the river to have the assistance of tugs, is not invalid as an interference with the rights of navigation or with interstate commerce, but is within the powers of the municipality in the absence of any legislation by Congress on the subject.—Circuit Court of Appeals, 210 F. R., 7.

Bond Issue—One of Illegality.

City of Geneva v. Fenwick.—Where bonds issued by the city of Geneva to meet an extraordinary expenditure for municipal purposes were not payable annually, as required by the city charter, as amended by Laws 1910, but were payable in five annual installments during the years 1925 to 1929, inclusive, the invalidity of the issue was not cured by the approval of the voters of the municipality.—New York Supreme Court, 145 N. Y. S., 885.

Action for Salary—Civil Service Employee.

Allen v. City of New York.—Since the city of New York can only pay a claim for salary as a member of the classified civil service on a duly authenticated pay roll from a proper department of the city government, as required by Greater New York Charter, and after the pay roll has been certified to by the civil service commissioner as provided by Civil Service Law, such employee cannot maintain an action against the city for an increase of salary, where the civil service commission refused to recognize the increases as legal; the propriety of the decision of a civil service commission not being reviewable in such an action against the city.—New York Supreme Court, 145 N. Y. S., 1022.

Negligent Obstruction of Street

Sheets v. City of McCook.—Neither the city nor the officers of its board of health are liable for damages sustained by reason of acts committed in the exercise of police power for the benefit of the public health and safety; but, if in the exercise of such powers such officers place a rope barrier across a public walk or street, which becomes and remains in a defective and dangerous condition, and the city either has actual notice of the defect, or it has existed for such a length of time as that notice will be presumed, the city may, if the facts in the case warrant, be held liable for its negligence in leaving the walk in an unsafe and dangerous condition.—Supreme Court of Nebraska, 145 N. W. R., 252.

Viaduct Over Railroad—Validity of Ordinance.

Pittsburgh & W. R. R. Co. et al. v. Borough of Butler.—A municipal ordinance directed the carrying of a street over the lands of a railroad company by means of a viaduct, the construction of which would temporarily inconvenience the railroad company in certain particulars and afford a permanent slight interference with the use of a freight station or approaching track, but would not preclude the use of the property for railroad purposes. The construction of the viaduct would contribute to public safety, and the railroad could be compensated in damages for any injuries sustained. Held, that the enactment of the ordinance was a reasonable exercise of that discretionary power to lay out and ordain streets which is vested in municipal authorities by General Boroughs Act, modified by Act. June 7, 1901.—Supreme Court of Pennsylvania, 89 A. R., 579.

Construction of Sewer—Statutes.

Nelson v. Dunn et al.—Where a sewer was constructed after, but under a contract let before, Cities and Towns Act 1905 went into effect, such act, and not the prior act, was properly followed in the acceptance of the work and the levying of the assessments; section 43 providing that, in case a city shall have commenced any proceeding or undertaking of a public nature, it "shall not be interrupted by the passage of this act, but shall be taken up and carried forward by the proper officer or department as provided in this act," the provision of section 272, repealing any prior inconsistent act, that "this repeal shall not affect pending litigation or proceedings thereunder," meaning that any proceeding which was then in any manner connected with any pending litigation should not be affected by the Acts 1905, and the proceeding for assessment, which is of a quasi judicial character, being separate and distinct from, though dependent on, the preliminary administrative acts of letting the contracts, and it being only to judicial acts before some judicial tribunal that the term "proceeding" may be properly applied in a legal sense.—Appellate Court of Indiana, 104 N. E. R., 45.

NEWS OF THE SOCIETIES

Calendar of Meetings.

April 4-11.

EFFICIENCY SOCIETY, INC.—First National Efficiency Exposition and Congress, Grand Central Palace, New York City. W. H. Tallis, exposition director, 41 Park Row, New York City.

APRIL 7-8.

MAINE ROADS CONVENTION—First Congress, under auspices of the State Grange and the Maine Automobile Association, Bangor. For information apply to Bangor Chamber of Commerce.

April 16-17.

TRI-STATE WATER AND LIGHT ASSOCIATION.—Annual Convention, Atlanta, Ga. F. C. Wyse, assistant secretary, Columbia, S. C.

April 23-24.

VIRGINIA PUBLIC HEALTH ASSOCIATION.—Annual meeting, University of Virginia, Charlottesville. Dr. M. G. Perrow, Lynchburg, Va., president.

May 11-15.

AMERICAN WATER WORKS ASSOCIATION.—Thirty-fourth Annual Meeting, Philadelphia, Pa. J. M. Diven, secretary, 47 State street, Troy, N. Y.

October 20-23.

INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.—Annual Convention, New Orleans, La. James J. McFalls, Secretary, Roanoke, Va.

May 18-23.

FIRST CANADIAN AND INTERNATIONAL GOOD ROADS CONGRESS.—The Arena, Montreal, P. Q. G. A. McNamee, General Secretary, New Belks Buildings, Montreal.

MAY 5-7.

NATIONAL FIRE PROTECTION ASSOCIATION.—Annual Meeting, Chicago, Ill. F. H. Wentworth, Secretary, 87 Milk street, Boston, Mass.

June 1-3.

NATIONAL CONFERENCE ON CITY PLANNING.—Annual Meeting, Toronto, Canada. Flavel Shurtleff, Secretary, 19 Congress street, Boston, Mass.

Minnesota Surveyors' and Engineers' Society.

At the annual meeting, Minneapolis, February 24-25, the following officers were elected for the ensuing year:

Walter F. Brooks, Consulting Drainage Engineer, Mankato, President; John H. Mullen, Deputy Engineer, State Highway Commission, St. Paul, Vice-President; George H. Herrold, Department of Public Works, Secretary; W. F. Rosenwald, District Engineer, State Highway Commission, St. Paul, Treasurer.

The next meeting will be held in St. Paul. One hundred and ten dollars was voted by the society for securing permanent headquarters in the city of St. Paul, in conjunction with the Civil Engineers' Society of St. Paul.

The following program was carried out:

February 24—Address of President; Report of Secretary-Treasurer; Appointment of Committees; Paper, "Advisability of Abolishing of County Surveyor's Office," Louis Knudsen, City Engineer, Brainerd; Discussion led by Walter F. Brooks, County Surveyor, Blue Earth County, H. S. Dartt, City Engineer, Owatonna, J. H. Armstrong, County Surveyor, Ramsey County, N. Y. Taylor, Civil Engineer; Recess to 1:30 p. m.; "Highway Bridges," Carl E. Nagel, Bridge Eng., Highway Comm.; "Concrete Highways," H. B. Childs, Division Eng., Highway Comm.;

"State Highway Laws," J. H. Mullen, Principal Assistant Engineer Highway Commission, St. Paul; Supper and Smoke Social at 6 p. m.

February 25—Paper, "Reorganization of State Drainage Commission and Suggestive Changes in Laws," Geo. A. Ralph, Consulting Engineer; Paper, "Amendments Desirable to Facilitate the Work of the State Drainage Engineer," E. V. Willard, Chief Engineer Drainage Commission; Paper, "Economy in Use of Tile Over Open Ditches in Medium Sized Drainage Work," C. W. Gove, Drainage Engineer; Paper, "Suggested Changes in Laws Affecting Construction of Drainage Ditches," W. R. Hoag, Drainage Engineer; Municipal Problems—G. H. Herrold, Office Engineer Board of Public Works, St. Paul.

Maine Roads Convention.

The following tentative program for the convention to be held at the Auditorium, Bangor, April 8-9, has been announced:

Tuesday, April 7.

9 a. m.—Registration of delegates; examination of exhibits, etc.

2 p. m.:

1. Address of welcome, mayor.
2. Response, Lyman H. Nelson of Portland, chairman of the State Highway Commission.
3. Why Maine Should Improve Its Highways, Governor William T. Haines.
4. The Grange's Interest in Highway Improvement, C. S. Stetson of Greene, master of the Maine State Grange.
5. Improved Highways, illustrated address, Prof. George T. Files of Bowdoin College.
6. Discussion.

Evening Session, 8.15 p. m.

Moving Pictures.

7. The Lake Asphalt Industry. Representative of the Barber Asphalt Paving Company.
8. The Manufacture of Portland Cement, Representative of the Lehigh Portland Cement Company.

Wednesday, April 8.

9. Highway Construction and Maintenance Day. Highway Construction and Maintenance in New Hampshire, S. Percy Hooker, state superintendent of highways in New Hampshire.
10. European and American Bridges, W. M. Denham, consulting engineer, of Springfield, Mass.
11. Massachusetts Highways, Col. William D. Sohler, of Boston, Mass., chairman of the Massachusetts Highway Commission.
12. How to Secure Large Returns for Small Outlay on Maine Highways, Paul D. Sargent, chief engineer of the Maine Highway Commission.

Afternoon Session, 2 p. m.

13. Working Prisoners on the Highways, Hon. John C. Scates of Westbrook.
14. Vermont Methods, C. W. Gates, of Montpelier, Vt., of the Vermont Highway Commission.
15. Bituminous Road Construction, illustrated address; Representative of Barrett Manufacturing Company. Films loaned by the Universal Portland Cement Company of Chicago, and exhibited by the Edison Portland Cement Company, of New York.
16. Cement Concrete Highway.
17. Road Maintenance, illustrated address, representative of United States public roads at Washington, D. C.

PERSONALS

Blauvelt, James G., Paterson, N. J., has been appointed a member of the Passaic Valley Sewerage Commission, succeeding William Mackenzie.

Cater, A. B., assistant city engineer of Rockford, Ill., has been appointed county superintendent of highways.

Dise, Alvin Percival, an engineer for the Board of Public Works, Harrisburg, Pa., has resigned to join the engineering staff of the Eastern Light and Fuel Company, Philadelphia, Pa.

Dodge, H. E., Sawyer, Mass., has been elected water commissioner.

Grant, Wilfrid, South Bend, Ind., has been appointed chief of the Gary, Ind., Fire Department.

Kimball, George H., has been retained by the city of Erie, Pa., to cooperate with City Engineer Briggs in drawing subway plans.

Liscomb, A. E., C. E. Madden and W. A. Sargent have been elected road commissioners of Eden, Me. Roy Hamor has been elected fire chief.

Lukins, Charles F., Pittsfield, Mass., has been elected a member of the Board of Water Commissioners.

Miller, A. W., Benicia, Cal., has been appointed city engineer.

Rockwood, Bradley M., Franklin, Mass., has been elected water and sewer commissioner.

Saunders, George, Muncie, Ind., county superintendent of highways, has appointed the following assistants: A. M. Wingate, Bortor Rees, Charles M. Curtis, George W. Lucas, Joseph Richman, Theodore Saunders, Jeremiah Ritchie, Charles Coffman, George W. Haney, H. W. Graham and Samuel H. Gray.

Stark, Howard, Colorado Springs, Col., has been appointed chief of police.

Tonnele, Laurent, Jersey City, N. J., has been appointed a member of the State Water Supply Commission.

Westinghouse, George, inventor and engineer, died in New York, March 12. His principal inventions were in the line of electric power and lighting, compressed air device and steam turbines. Mr. Westinghouse was president of the Pittsburgh Meter Co. and other companies.

NEW APPLIANCES

SEGMENT BLOCK SEWERS.

The accompanying cuts and descriptions show the proper method of building segment block sewers of the vitrified blocks made by the American Sewer Pipe Company, Akron, O. The

the engineer. Lay invert course to line and level each block with spirit level. Stretch line for second and third courses and test work with the inside template. All succeeded courses to the spring line should be laid to

These blocks are 12 ins. long or $\frac{1}{2}$ length of standard blocks. On each succeeding alternate course, break joints as above. Mortar the scratched side surfaces of the block to insure not only a tight joint, but for even dis-



1. FIRST BLOCKS.

2. BREAKING JOINTS.

3. TAMPING EARTH.

numbers of the paragraphs correspond to those of the cuts:

No. 1—Place the outside template in the center of the trench, the inside circle of which conforms to the internal diameter of the sewer. Lay first

line and template as above. Tamp back of each block to obviate settle of sewer. Lay the male ship-lap at the discharge end of sewer. This must be observed, as all Y connections incline toward this end of block and failure

tribution of load. Mortar joint should be $\frac{1}{4}$ -in. wide.

No. 3—Tamp the earth back of all blocks on each course. Bring up to the spring line laying each course to line and test with template.



4. SETTING THE FORM.

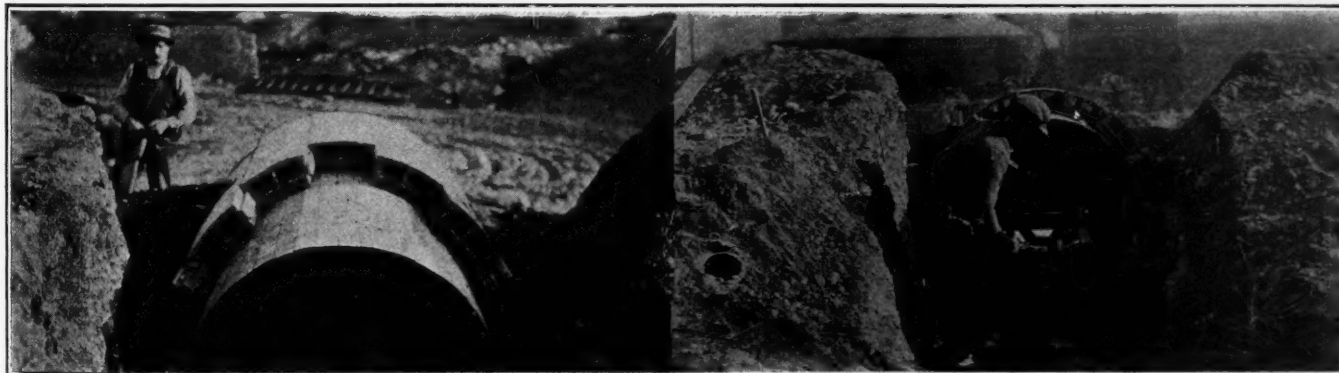
5. SETTING KEY WITH MORTAR.

block or invert at discharge end and in the center of the trench. Stretch a line from the corner of the invert block to the template, same to conform to grade and line established by

to follow the above would reverse flow of sewage from such connections. Fill ship-lap joint with mortar.

No. 2—Break joints by laying short blocks on second and third courses.

No. 4—After the sewer has been laid to the spring line, set the form in the trench and close the top with blocks laid without mortar. Raise or lower form until a space is left on one side



6. BACKFILLING WITH EARTH.

7. COLLAPSING FORM.

of key block which will equal the combined mortar joints in the arch. Mark wedge rod that form may be raised to same height after collapse. After form has been properly adjusted, cover arch to key with blocks laid in mortar.

No. 5—Mortar both sides of adjacent courses and push key block into place. The form should be high enough that the key block may slip into place without undue force. In covering the arch step forward one block on each course and close arch.

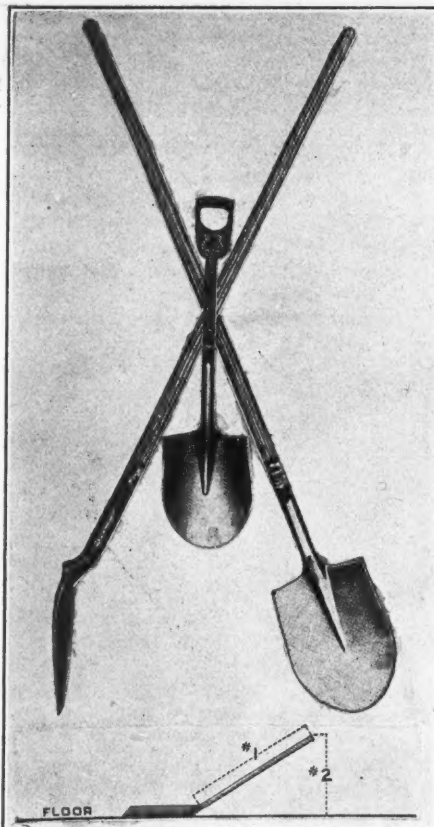
No. 6—Cover arch working forward until last block at spring line is supported on form, each course stepping back and arch closed. Back fill to one block above spring line on sizes 48-in. and under and two blocks on sizes above 48-in. This filling should be tamped but not hard enough to distort sewer. Form can then be collapsed. Fill all joints in the arch with mortar.

No. 7—To collapse form, use the heavy links in wedge rod as jacks and lower wedge. Bring form forward until joints on last key block just covers the form and bump or raise wedge rod to the mark previously made for height. Proceed covering form as before. Back filling can be begun as form is collapsed.

CONNEAUT SPECIAL SHOVELS.

The Conneaut Shovel Company, Conneaut, O., besides manufacturing shovels in several grades, make a special line which are claimed to be the best shovels that can be made. They are formed on wooden blocks by Swedish workmen. Each handle is tested by submitting it to a greater strain than it will ever be called on to stand in actual work.

The illustrations show views of the Conneaut long-handle and short-handle round point shovel for sewer excavating. They are hand pounded and tem-



CONNEAUT SEWER SHOVELS.

pered by Swedish workmen. The handle of the long-handled shovel is $4\frac{1}{2}$ feet long and has a 30-inch drop. It is made in five sizes. The D handle shovel is 26 inches long with 19-inch drop. It also is made in five sizes. It has a tempered point; is strong where the handle joins the blade, and has a long rib in the center.

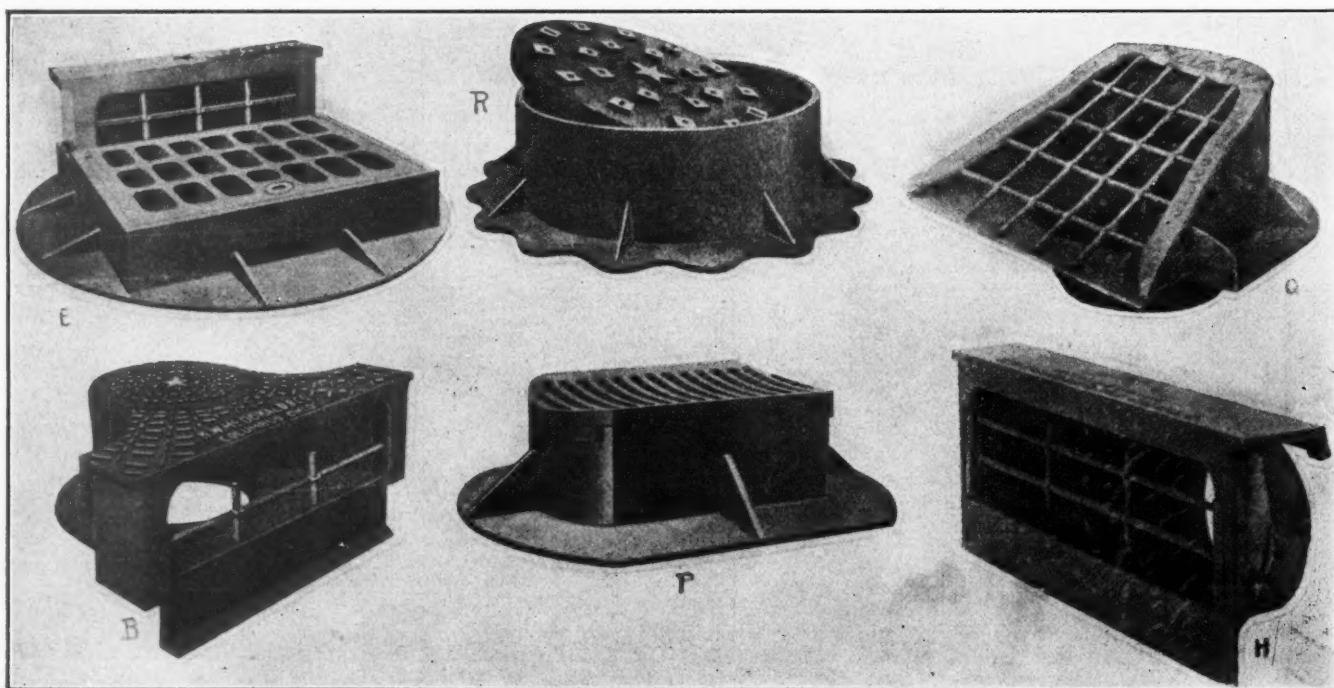
The diagram is an aid in ordering shovels. No. 1 is the length of the shovel handle, measured as shown in the diagram. No. 2 is the lift or drop.

STREET CASTINGS.

The first sewer inlets ever placed on the market were, we believe, made by H. W. McDonald & Co., Columbus, O., who have manufactured street castings for twenty-eight years. The company now makes some twenty-eight different styles, including sewer inlets, catch basins, shear gates, flap gates, road inlets, park drains, man-hole covers, lamp hole covers, monument covers, street railway inlets, cistern covers. These goods include numerous improved features, made by this company alone. Their adjustable basins and inlets are made so that the curb section is adjustable without the means of bolts or nuts. In combination with this is an adjustable and removable wrought iron curb grate which permits the grate bars to occupy a proper position in curb box at any elevation, or the grate to be removed entirely if desired. The adjustable designs also have removable gutter grates, provided with locking device. The removable grates in both curb and gutter sections afford abundance of waterway and every necessary facility for examining or cleaning out the basin or pipe connection.

The McDonald curb inlets are specially neat in design. When placed on the curb, at the lot line extended, they may be used to divert water so as to leave a dry and almost continuous walk. They do not obstruct the street or walk and are economical to instal.

Six styles of McDonald castings are selected for illustration and description. Pattern B can be used as an inlet or catch basin. Has a vertical face, wrought iron grate, heavy 18-inch manhole lid and is adjustable in curb depth, varying from 5 to 10 inches. Has hand hole for inspection, etc. If used as an inlet is made to connect with 10, 12 or 15-inch pipe connections. The manufacturers recommend this as



SIX OF McDONALD'S TWENTY-FIVE TYPES OF STREET CASTINGS.

one of the most modern and serviceable on the market. Pattern E has a horizontal waterway and is adjustable vertically to conform to any depth of gutter varying from 5 to 10 inches. It has an adjustable and removable wrought iron curb grate. There is a locking device designed to hold both grates securely in place. Pipe connection sizes 10, 12 and 15 inch. Any radius. Pattern H—This has a vertical 10-inch face, 6-inch curb, an 8 by 30-inch waterway and removable wrought iron grate; is supplied with a 4-inch face plate and a rear outlet, for connection with a 12-inch sewer pipe. The interior has four inches fall from top of face plate to outlet. It is for piping away water near the surface. Pattern P—The dimensions of this inlet are 14 by 22 inches and it is covered and protected with a heavy, deep-seated concave and removable grate. The flanged bottom rests upon a small catch basin, into which outlet pipe is walled. A pattern very similar to this, rectangular in shape with narrower flange, is used to drain street car tracks, a detail in street drainage,

which if neglected causes a good deal of trouble. Pattern Q—Pattern Q is especially well adapted for conducting surface water into sewers and underdrains at bridge approaches, road crossings, driveways, underdrains intersecting country roads, and for suburban work generally. The face of inlet slopes back at an angle of 60 degrees, and is protected by a removable grate, or lid, into which is cast $\frac{1}{2}$ -inch wrought iron bars, intersected at right angles with malleable iron cross bars, securely riveted together. The 4-inch flange rests upon a brick or stone foundation and has recesses in front for stone posts, which hold it securely in position. The outlet is left 18 inches in diameter or reduced to fit 8, 9, 10, 12 or 15-inch sewer pipe. Pattern R—Pattern R manhole cover has a heavy, close-fitting and deep-seated 24-inch lid, guaranteed to withstand all kinds of street traffic. The interior of casting is arranged for the insertion of dirt pans which the company furnishes upon order. Also have an 18-inch manhole cover similar to this design.

made a contract with the Orenstein-Arthur Koppel Company, Chicago, to lease for three months with an option to purchase seven miles of track with forty-one and one-half cubic yard cars and a thirty-horse power locomotive. The outfit will first be tried on a road where the maximum haul is six and a half miles. The road will be graded its entire length and the track laid on one side. The materials will be delivered as fast as possible independently of the speed of the work. The loading from standard railroad cars to the little cars will be done by a locomotive crane.

Asphalt Paving Plant.—The city of Cleveland, O., has ordered from the F. D. Cummer & Son Company, Cleveland, a stationary asphalt paving plant with guaranteed capacity of 1,500 yards of finished pavement per day of 2-inch top and $1\frac{1}{2}$ -inch binder. In view of the increasing use of electric power by contractors for operating crushers, pumps, hoisting engines, etc., it is interesting to note that this plant will be electrically driven. So far as we know it will be the first asphalt plant in the country to be so driven. Moreover, it is probable that power generated in the Cleveland municipal plant will be available. The Cummer Company will supply their latest approved machinery.

New Pipe Plant.—The Anniston (Ala.) plant of the Lynchburg (Va.) Foundry Co. has begun operations with a daily capacity of more than 100 tons of pipe. It is of fireproof construction, and represents an investment of approximately \$250,000, providing employment for about 200 men. There are two pipe-casting pits, of circular form, each having a daily capacity of from 50 to 60 tons. These pits are of steel and concrete construction.

Tar.—The Anglo-American Tar Products Co. has made a ten-year contract with the Laclede Gas Light Co., St. Louis, Mo., to purchase about 7,000,000 gallons of tar per annum. This will be refined in various ways and placed on the market by the Anglo-American Co. The tar will be produced at a new coke oven plant, which the Laclede company has built for the purpose of making gas from coal rather than oil.

Bituminous Paints.—Besco bituminous paints, manufactured by the Bituminous Products Co., 378 Woodward avenue, Detroit, Mich., are produced and made for particular purposes. The manufacturers speak of these paints as "Particular paints for particular work." They invite inquiries from persons in need of a dip paint, roof paint, waterproof paint, protective paint, bonding paint or general purpose paint.

Electric Signals.—The Dean Electric Company, Elyria, Ohio, has been reorganized and the Dean products will be manufactured by the newly organized Garford Manufacturing Company, of Elyria. The officers of the new company are: A. L. Garford, president; A. G. Bean, vice-president; A. L. Patrick, treasurer, and John Watson, secretary. In addition, John Sherwin,

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago. Prices have been shaded. Quotations: 4-in., \$26; 6 to 12-in., \$24; 16-in. and up, \$23.50. Birmingham. Plants all operating at full time. The American Cast Iron Pipe Co. is changing its pits to produce 16-ft. pipe. It is shipping pipe to Cuba. Quotations: 4-in., \$22; 6-in. and up, \$20. New York. Private buying has improved. Quotations: 6-in., carloads, \$22 to \$23.

Lead.—Lead is being exported. Quotations: New York, 4c.; St. Louis, 3.90c.

BOOK TO TRUCK BUYERS.

Goodrich Book Gives Needed Information On Efficient Buying.

That manufacturers of trucks and accessories are uniting in their efforts to give truck buyers wanted facts about motor transportation is brought out by the publication of Vol. II. Motor Trucks of America, by the B. F. Goodrich Company, Akron, O. This book contains a buying guide compiled by the Review of Reviews which greatly simplifies the task of purchasing and ought to be of value to every truck buyer.

It appears that a motor truck can be worked at a profit in almost every class of delivery service, provided that the right type of truck is selected for the particular class of work it must do. And when trucks have not been profitable investments, it has been found due to lack of information and consequently wrong selection.

The aim of the book seems to be to supply prospective buyers this needed data about motor transportation that will enable them to select exactly the right truck for their particular service.

This book also contains illustrations and specifications of truck manufacturers whose combined output represents about 90 per cent. of the trucks made in this country.

The publication of such a guide for truck buyers is bound to be of much value to the buyer, and will react favorably for the good of the truck industry.

Of especial interest in the volume is an article, "Efficiency in Buying and Operating Motor Trucks," by W. A. McDermid, which appeared in The Review of Reviews, November, 1913. In this article Mr. McDermid emphasizes the necessity for taking the standards of the engineer as the standards for the motor truck operator and explains how to obtain the largest number of productive minutes of time per unit of machinery.

The first announcement of this book flooded the Akron office with requests from all over the country and has compelled a second volume. Prospective truck buyers would do well to write to the B. F. Goodrich Company, Akron, Ohio, who will be glad to send you a copy upon receipt of your request on your business letter head.

Industrial Railroad.—The County Commissioners of Wayne County, Mich., will undertake an experiment in transportation this year which is new to them. In the course of construction of their concrete roads, very long hauls are sometimes encountered. Moreover, the hauling problem is further complicated by the inability to use the newly finished roadway for hauling. To meet this situation the engineers have figured that an industrial railroad will effect a saving. Accordingly, they have

New Branch Offices.—The H. W. Johns-Manville Co., Madison avenue and 41st street, New York, announce the following changes of addresses in their branch offices. The new offices are: Indianapolis, Ind., 408-410 North Capital avenue. Louisville, 669-661 South Fourth avenue. Both of these branches will include ample warehouse accommodations, in addition to show rooms for the display and sale of this firm's varied line of asbestos roofing, pipe coverings, insulating materials, lighting fixtures, automobile accessories, etc. In connection with the last-named line, unusual pains have been taken in the equipment of service departments for the benefit of the customers who desire speedy adjustments, repairs or replacements.

Road Meetings.—The following road meetings have been noted:

April 7-8, All-Southern Highway Convention, Lake Charles, La.

March 24.—Organization meeting. Bristol to Norfolk Highway Association, Lynchburg, Va.

April 9-10.—Florida State Good Roads Association, Gainesville, Fla.

April 15-16.—Road Commissioners of the State of Georgia, Atlanta, Ga.

NEWS OF THE SOCIETIES.

(Continued from page 412.)

International Ass'n of Fire Chiefs.

Secretary James McFall has issued the following bulletin to members:

The directors at a meeting held in New Orleans, on February 23d, selected October 20, 21, 22 and 23, as the date for our Annual Meeting. Chief Pujol advises us that this season of the year is most delightful, your usual summer clothes can be worn with comfort. Chief Pujol and his officials are now planning a most delightful program for our annual meeting. The sessions of the convention will be held in Grunewald Hotel. The exhibits will be housed in the Washington Artillery Barracks, a large and commodious hall. The engine and apparatus test and demonstration will be held on Canal street, the widest street in the world. The engine test will be from an open canal.

Hotel rates, topics and subjects for discussion will go out in a later circular.

You have seven full months to make your arrangements to be in New Orleans. The Secretary, as usual, is at your service in assisting you in interesting your officials—say when.

National Association of Park Superintendents.

At a meeting at Hotel Astor, New York City, last week, the executive committee selected Newburgh, N. Y., as the convention city and August 24-27 as the time. In the absence of President Richards, of Chicago, Secretary Manning, of Baltimore, occupied the chair. The afternoon and evening of August 24 will be devoted to business sessions. Tuesday will be devoted to an inspection of Newburgh's

park and places of historical interest in this vicinity. The trip will include a visit to the site of the Falls house. Wednesday morning another business session will be held and on Wednesday afternoon the superintendents will charter one of the Day Line steamboats, probably the Hendrick Hudson, and go down the river, stopping at West Point and Harriman Park. Wednesday night the superintendents will be the guests of New York City Park Commissioners and Thursday will be devoted to inspecting the park system of the metropolis. The convention will be adjourned on Thursday night.

PERSONALS.

(Continued from page 412.)

Daub, Jacob, Hewlett, L. I., N. Y., has been appointed deputy superintendent of highways by the Hempstead Town Board.

Jones, Webb, Oklahoma City, Okla., has been appointed chief of police.

Phillips, Asa E., superintendent of sewers, District of Columbia, engineering department, delivered a lecture last week on "The Disposal of Sewage" before the Washington Y. M. C. A.

Risley, W. I., has been elected city engineer of Longport, N. J., succeeding John Ashmead. Mr. Risley is also the city engineer of Ventnor.

The following mayors have been elected in Maine cities:

Auburn—A. W. Fowles (re-elected).

Bath—Arthur J. Dunton.

Eastport—Edgar M. Cherry.

Ellsworth—Dr. A. C. Hagerthy.

Hallowell—Samuel G. Otis.

Lewiston—Dr. R. J. Wiseman.

Rockland—Philip Howard.

South Portland—Charles E. West.

Saco—Myron A. Pillsbury (re-elected).

Waterville—Louis E. Hilliard.

Biddleford—James G. C. Smith, re-elected.

Brewer—Frank H. Nickerson.

Bangor—John G. Utterback.

Augusta—Elmer E. Newheit.

Belfast—Edgar T. Hanson.

The following officials have recently been elected or appointed.

Trezevant, Tenn.—J. H. Mowen, mayor.

Gaffney, S. C.—H. H. Littlejohn, mayor.

Dalworth, Tex.—G. W. Spikes, mayor.

Bay St. Louis—L. B. Capapon, mayor.

Daytona, Fla.—Henry T. Titus, mayor.

Montrose, Col.—Charles J. Monihan, mayor.

Lafayette, La.—Dr. J. L. Chiason, mayor.

PROPOSALS

NOTICE TO PAVING CONTRACTORS.

Sealed bids will be received by the Borough of Sharpsville, Pennsylvania, until 6 P. M., Eastern Time, April the 21st, 1914, for grading and paving with bricks, the following named streets in the Borough of Sharpsville, according to plans

and specifications in the engineer's office, in said borough.

SEVENTH STREET: from Main Street to Ridge Avenue.

RIDGE AVENUE: from Seventh Street to Western Borough Line.

Approximately 12,000 square yards.

Contractor must attach a certified check for One Thousand Dollars (\$1,000) to his bid, made payable to C. W. Foster, Borough Treasurer, as a guarantee that he will execute a contract if awarded the work.

Contractor required to bid on, cement grout filler and coal tar pitch filler, according to specifications, failure so to do will render bid informal.

Specifications may be had by applying to the Secretary of the Borough of Sharpsville, to whom all bids must be mailed or delivered.

The Council reserves the right to reject any or all bids.

The Borough of Sharpsville,
WILLIAM A. GRABER, Secretary.

PAVING BIDS WANTED.

Sealed bids will be received for the construction of Vandalia Paving District, including street railway portion in the City of Collinsville, Illinois, on the 28th day of March, 1914, at the hour of 2 o'clock P. M., in the Council Chamber, in the City of Collinsville, Illinois.

Estimate—11,925 square yards vitrified brick paving on 4-inch concrete foundation. Also 3,852 square yards brick paving in railway right of way; 9,200 feet gravel concrete curb and gutter; 100 feet 10 inch sewer; 80 feet 12 inch sewer; 6 catch basins.

All bids to be on form furnished by City Clerk, with certified check for 10 per cent. of bid, payable to President Board of Local Improvements, City of Collinsville, properly sealed, and addressed to the Board of Local Improvements.

Right reserved to reject any and all bids.

BOARD OF LOCAL IMPROVEMENTS,
City of Collinsville, Illinois.

By JAMES G. MATTHEWS,

President.

JOHN BANKS, Secretary.

SANITARY SEWER SYSTEM.

Angola, Indiana.

Sealed proposals for the construction of a System of Sewers for the North Side, and for Dist. 22, Sewer Improvement Resolution No. 3, of the City of Angola, Ind., will be received by the City Council up to half past one o'clock P. M. of the ninth (9th) day of April, 1914, in the office of the City Clerk.

The work to be done consists of about 26,700 ft. of vitrified pipe sewer. The estimated cost being about \$43,000.00.

Plans, Specifications and Proposal Forms may be obtained from the City Clerk.

The Council reserves the right to reject any or all bids.

ROY HIRST, City Clerk.

C. F. POWERS, City Engr.

TREASURY DEPARTMENT, Supervising Architect's Office, Washington, D. C., March 17, 1914.—Sealed proposals will be opened in this office at 3 p. m., April 27, 1914, for the construction complete (including mechanical equipment, interior lighting fixtures, and approaches) of the United States post office at Cadillac, Mich. The building is one story and basement, having a ground area of approximately 6,140 square feet; stone facing; tin roof; fireproof construction. Drawings and specifications may be obtained from the custodian of site at Cadillac, Mich., or at this office, in the discretion of the Supervising Architect. O. Wenderoth, Supervising Architect.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS				
Ind.	Green Castle	.....2 p.m., Mar.	21..Constructing gravel and macadamized highway.....	Bd. Comrs., Putnam & Hendricks Counties.
O.	Warren	.....1 p.m., Mar.	21..Improving road	Board Township Trustees.
Wash.	Homer	.....Mar.	21..Paving 4½ miles, various materials.....	County Comrs.
Ind.	Indianapolis	.....10 a.m., Mar.	23..Grading, paving and curbing; three jobs.....	Board Public Works.
Mich.	Charlevoix	.....noon, Mar.	23..Constructing state roads.....	Board Road Comrs.
Wis.	Milwaukee	.....10.30 a.m., Mar.	23..Furnishing three grades road oil.....	Dept. Public Works.
N. J.	Passaic	.....Mar.	23..Paving with asphalt.....	G. L. Segar, Deputy City Clk.
Minn.	Minneapolis	.....11 a.m., Mar.	23..Graveling about 29,000 lin. ft. road.....	A. P. Erickson, Co. Aud.
La.	Breaux	.....Mar.	23..Constructing 12,000 sq. yds. cement walks with curbing.....	C. C. Rees, Mayor.
Fla.	Jacksonville	.....Mar.	23..Paving two streets.....	Board of Bond Trustees.
Kan.	McPherson	.....Mar.	23..Asphaltic concrete pavement and curb, cost \$75,000.....	H. A. Roland, City Engr.
Ia.	Indianola	.....7 p.m., Mar.	23..44,000 yds. paving, various materials; also curb and gutter.....	W. A. Graves, City Clk.
Ia.	Plainfield	.....8 p.m., Mar.	23..Pavement, curb and gutter.....	A. B. Welch, City Clk.
N. Y.	Harrietstown	.....Mar.	23..Highway improvement.....	Comr. Carlisle, Albany.
Tex.	Galveston	.....Mar.	23..Shelling and bulkheading road.....	J. M. Murch, Co. Aud.
Minn.	Princeton	.....noon, Mar.	24..Grading, turnpiking, etc., 10 miles.....	W. C. Doane, Co. Aud.
Colo.	Boulder	.....10 a.m., Mar.	24..Surfacing, 3½ miles.....	J. Townley, Chr. Bd. Co. Comr.
N. J.	No. Arlington	.....Mar.	24..Furnishing stone for year.....	F. Jetter, Acting Boro. Clk.
N. J.	Maplewood	.....Mar.	24..Oiling, eight miles for year.....	C. A. Cross, Chr. Twnshp. Com.
Minn.	Fergus Falls	.....2 p.m., Mar.	24..Certain road tools and machinery.....	W. Lincoln, Aud. of Otter Tail Co.
Wash.	Waterville	.....Mar.	24..Road work; cost, \$25,000.....	L. T. Griswold, Co. Engr.
Pa.	Harrisburg	.....Mar.	24..9-foot brick road, 1¼ miles.....	J. P. Upchurch, Co. Supt. Hys.
Ill.	Princeton	.....2 p.m., Mar.	24..Paving street	Board Local Improvements.
O.	Newton Falls	.....Mar.	24..Paving and curbing several streets.....	H. A. Herbert, Vil. Clk.
Wash.	Port Orchard	.....Mar.	24..Improving permanent highway	County Comrs.
Wash.	Port Angeles	.....Mar.	24..Furnishing material and paving various streets.....	J. L. Beam, City Clerk.
Ind.	Muncie	.....9 a.m., Mar.	24..Constructing sidewalk.....	J. R. Kelly, City Clk.
Ia.	Traer	.....Mar.	24..18,570 sq. yds. paving, and 8,380 lin. ft. curb.....	H. L. Daniel, Twn. Engr.
Mont.	Billings	.....Mar.	24..Paving work.....	C. E. Durland, City Engr.
Ia.	Waukon	.....7 p.m., Mar.	24..21,000 sq. yds. vitrified brick on concrete.....	J. B. Cowan, City Clk.
Md.	Baltimore	.....noon, Mar.	24..30.63 miles road.....	State Roads Commission.
Mich.	Wyandotte	.....8 p.m., Mar.	24..Paving with brick block, grading and curbing.....	J. L. Sullivan, City Clk.
Ill.	Des Plaines	.....7.30 p.m., Mar.	24..Constructing concrete pavement.....	Board Local Imp.
Ill.	Chicago	.....4 p.m., Mar.	24..Furnishing crushed stone, asphaltic cement, etc.....	West Chicago Pk Comrs.
W. Va.	Fairmount	.....noon, Mar.	25..Constructing about 18 miles improved roads.....	Marion County Court.
Minn.	Grand Rapids	.....10 a.m., Mar.	25..Constructing two highways.....	M. A. Spang, Co. Aud.
Minn.	Deer River	.....Mar.	25..Constructing 40 miles highway.....	Co. Board Comrs.
O.	Cleveland	.....noon, Mar.	25..Crushed stone or gravel and sand.....	A. R. Callow, Com. Pur. & Sup.
Ind.	Fort Wayne	.....Mar.	25..Grading, drainnig and paving.....	C. H. Brown, Aud.
Mass.	Worcester	.....11.15 a.m., Mar.	25..Furnishing block paving.....	A. T. Rhodes, Street Comr.
O.	Lorain	.....noon, Mar.	25..Paving with vitrified brick or asphalt.....	Director Public Service.
W. Va.	Marion	.....Noon, Mar.	25..Constructing about 18 miles permanent road.....	County Court.
Ill.	Princeton	.....Mar.	25..Grading, curbing, macadam pavement and sidewalk.....	Bd. Loc. Imps.
Mo.	Joplin	.....Mar.	25..Improving street	C. P. Anderson, City Engr.
Conn.	New Haven	.....2 p.m., Mar.	25..Paving with various materials on concrete foundation.....	F. L. Ford, City Eng.
O.	Findlay	.....1 p.m., Mar.	26..Constructing water bound macadam road, 4 jobs.....	Co. Comrs.
Wash.	Woodland	.....Mar.	26..Hard-surfacing three streets	L. Hopf, Town Clerk.
Fla.	Jacksonville	.....Mar.	26..Paving with vit. block on concrete.....	City Clerk.
Tex.	San Antonio	.....4 p.m., Mar.	26..Furnishing broken limestone, brick, blocks, asphalt, etc.....	City Clerk.
Ia.	Boone	.....noon, Mar.	27..71 sq. yds. pavement, cost \$120,000.....	H. C. Kastberg, City Clerk.
O.	Amherst	.....Mar.	27..Draining, paving with various materials.....	C. G. Aschembach, Clk.
Ill.	Collinsville	.....Mar.	27..Constructing vit. brick pavements.....	City Clerk.
Pa.	Wilkes-Barre	.....noon, Mar.	27..Furnishing 40,000 gals. road oil.....	City Clerk.
Minn.	Ada	.....Mar.	27..Constructing ten miles road.....	D. F. Fulton, Aud.
N. Y.	Albany	.....1 p.m., Mar.	27..Road improvement in several counties.....	J. N. Carlisle, Comr.
O.	Cincinnati	.....Mar.	27..Constructing concrete sidewalks and road improvements.....	A. Reinhardt, Clerk.
Ind.	Marion	.....10 a.m., Mar.	28..Furnishing crushed stone and road oil.....	W. T. Patten, Co. Aud.
Ind.	Indianapolis	.....Mar.	28..200,000 gals. road oil, and 400 carloads of crushed stone.....	City Clerk.
Minn.	Walker	.....Mar.	28..Constructing state rural highway, 23.6 miles.....	I. P. Byhre, Co. Aud.
O.	Kent	.....Mar.	28..Brick paved driveway.....	R. Hecker, Eng. Cleveland.
Ind.	Muncie	.....10 a.m., Mar.	28..Grading, graveling and macadamizing.....	Board Comrs.
Minn.	Walker	.....2 p.m., Mar.	28..Clearing, grading, turnpiking, etc., 23.6 miles.....	I. H. Byhre, Co. Aud.
Mich.	Highland Park	.....Mar.	30..Three miles sheet asphalt; reinforced concrete and brick asphalt; cost, \$33,000.....	R. Milton Ford, Vil. Clk.
Wash.	Humptulips	.....Mar.	30..Improving 7.8 miles highway	State Hwy. Bd., Olympia.
Ia.	Atlantic	.....Mar.	30..Concrete paving, 50,000 sq. yds.....	E. Nicholas, City Clk.
O.	Cleveland	.....noon, Mar.	30..Furnishing and delivering composite sand and gravel.....	A. R. Callow, Comr. Purchases & Supplies.
Cal.	Sacramento	.....Mar.	30..Furnishing material and constructing roads in 7 counties.....	State Highway Commission.
O.	Ottawa	.....noon, Mar.	31..Furnishing material and constructing road.....	Co. Comrs.
O.	Findlay	.....Mar.	31..Ten ml. waterbound macadam.....	A. R. Taylor, Engr.
Utah	Salt Lake City	.....Mar.	31..20,000 sq. yds. asphalt, 25,000 Utah rock asphalt pavets. and 16,000 lin. ft. concrete curb and gutter.....	N. Warrum, City Recorder.
Alta.	Edmonton	.....Mar.	31..Paving, 1914	City Comrs.
Ill.	Springfield	.....noon, Apr.	1..Cement for State Aid road construction during 1914.....	State Highway Commission.
N. J.	Trenton	.....Apr.	1..Paving twelve streets; cost, \$100,000.....	City Commission.
O.	Cheviot	.....noon, Apr.	1..Street improvement.....	A. J. Reusing, Clerk.
Wash.	Mt. Vernon	.....Apr.	1..Constructing 3 miles of highway; cost, about \$35,000.....	Co. Comrs.
Tenn.	Nashville	.....Apr.	1..Paving with various materials.....	W. W. Southgate, City Engr.
Man.	Emerson	.....Apr.	1..Constructing concrete sidewalk; cost, \$7,000.....	W. W. Unsworth, Clk.
N. J.	Elizabeth	.....Apr.	1..50,000 sq. yds. bituminous concrete pavement.....	City Clerk.
Ia.	West Union	.....Apr.	1..28,000 sq. yds. paving, various materials.....	R. P. Camp, City Clk.
N. J.	Plainfield	.....Apr.	2..Resurfacing and repaving streets.....	Council.
Pa.	Pittsburgh	.....10 a.m., Apr.	2..Furnishing brick block, rock asphalt, sand, etc.....	R. J. Cunningham, Co. Control.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Pa.	Swissvale	8 p.m., Apr.	2.. Laying concrete sidewalks for year.	W. F. Libbey, Sup. Pub. Wks.
O.	Cincinnati	Apr.	3.. Crushed stone road.	County Comrs.
O.	Ottawa	noon Apr.	6.. Furnishing road machinery.	County Auditor.
Ind.	Brownstown	2 p.m., Apr.	6.. Roads in two townships.	County Comrs.
Ind.	Fowler	1 p.m., Apr.	6.. Constructing various roads.	Board Comrs.
Ind.	Hartford City	2 p.m., Apr.	6.. Road construction.	Co. Comrs.
Minn.	Minneapolis	11 a.m., Apr.	6.. Grading and graveling.	A. P. Erickson, Co. Aud.
Ind.	Franklin	2 p.m., Apr.	6.. Improving gravel road; cost, \$12,005.	Co. Comrs.
Miss.	Hattiesburg	Apr.	6.. Furnishing material, grading, surfacing and bridging, about 9 miles.	J. H. Denham, Sec. Hy. Comm.
N. D.	Bowman	Apr.	6.. Grading roads; two jobs.	E. M. Fairbanks, Aud.
O.	Jefferson	1 p.m., Apr.	7.. Grading street.	Board Co. Comrs.
S. D.	Leola	3 p.m., Apr.	7.. For Galvanized corrugated steel culverts.	J. B. Whittmayer.
Ind.	Kokomo	Apr.	7.. Constructing gravel, brick and stone road in several townships.	E. B. Swift, Co. Aud.
Ind.	Winamac	Apr.	7.. 3 mile road; cost, \$8,800.	C. E. Paul, Co. Surveyor.
Ala.	Guntersville	noon Apr.	7.. Grading and draining 25 miles road; paving 5 miles chert and gravel; also 4 miles macadam.	T. D. Kemp, Co. Engineer.
Ind.	Knox	noon Apr.	7.. Grading, draining, paving; two jobs.	Board Co. Comrs.
Ind.	Princeton	10 a.m., Apr.	7.. Grading, draining and paving with stone.	Co. Comrs.
Minn.	New Ulm	5 p.m., Apr.	8.. Grading, graveling and boulevarding.	A. J. Meyer, City Clerk.
Ind.	Boonville	10 a.m., Apr.	8.. Grading, draining and paving highway.	Board Co. Comrs.
S. D.	Plankinton	Apr.	8.. 15 miles highway.	E. Johnson, Co. Aud.
Pa.	Kane	Apr.	13.. Grading, curbing and paving.	Town Council.
Minn.	Chaska	8 p.m., Apr.	13.. Reinforced concrete approaches to bridge.	J. M. Aretz, City Clk.
O.	Niles	Apr.	15.. Paving six streets; brick on slag foundation.	J. N. Cowdrey, Dir. Pub. Serv.
Pa.	Sharpsville	6 p.m., Apr.	21.. 12,000 sq. yds. brick pavement.	W. A. Graber, Sec.
O.	Hopewell	noon Apr.	23.. Macadamizing highways.	C. Snyder, City Clk.
O.	Urbana	Apr.	26.. 22,500 sq. yds. pavement.	Bd. Pub. Service.
N. J.	Newton	May	1.. Improving 10 miles highway; cost, \$100,000.	H. Snock, Co. Engr.
O.	East Liverpool	noon, May.	15.. Paving with brick or paving blocks; eight jobs.	E. J. Smith, Dir. Pub. Ser.
SEWERAGE				
Wis.	Racine	10 a.m., Mar.	21.. Furnishing materials and constructing sewers.	Board Public Works.
Ind.	Indianola	7 p.m., Mar.	23.. About 1,200 ft. sewer pipe, 8-24 inch.	W. A. Graves, City Clk.
N. Y.	Larchmont	Mar.	23.. Constructing two systems sewers.	Bd. Village Trustees.
Ind.	Burlington	9 a.m., Mar.	23.. Furnishing sewer pipe and cement.	R. Kropach, City Clerk.
Mo.	Webster Grove	Mar.	23.. Constructing sewers; cost, \$20,000.	City Clerk.
Tenn.	Memphis	noon, Mar.	23.. Constructing sewer, walls and sheeting for levee.	City Clerk.
Ind.	Burlington	9 a.m., Mar.	23.. Sewer pipe, cement, etc., for fiscal year.	H. Kropach, City Clk.
Wis.	Superior	1 p.m., Mar.	23.. Sewer construction.	P. J. Ekstrand, Chr. Bd. P. W.
Tenn.	Greeneville	Mar.	24.. Constructing sanitary sewers.	G. W. Glick, Recorder.
Cal.	Mare Island	10 a.m., Mar.	24.. Furnishing quantity terra cotta sewer pipe.	T. J. Cowie, Paym. Genl., U. S. N. Wash., D. C.
La.	Mansfield	Mar.	24.. Installing sewerage system.	J. W. Parsons, Mayor.
Conn.	New Haven	Mar.	24.. Sewers and appurtenances.	F. L. Ford, City Engr.
Va.	Roanoke	noon Mar.	24.. 24-inch storm water sewer.	W. L. Craft, City Clk.
N. Y.	Brooklyn	10 a.m., Mar.	24.. Supplying sewer pipe.	Navy Dept., Washington, D. C.
Ill.	Des Plaines	7.30 p.m., Mar.	24.. Sewer pipe.	Bd. Local Imp.
O.	Lowellville	noon, Mar.	24.. Constructing storm sewer.	City Clerk.
N. Y.	Binghamton	4 p.m., Mar.	25.. Constructing vit. pipe sewers.	F. M. Hopkins, City Clk.
O.	Springfield	noon Mar.	26.. Sewer construction.	C. E. Ashburner, City Mgr.
Ind.	Richmond	10 a.m., Mar.	26.. Constructing 2 1/2 miles 12 to 54-inch sewer.	F. R. Charles, Eng.
Ind.	Council Bluffs	2 p.m., Mar.	27.. 9 miles of sanitary sewers.	J. B. Hannan, Auditor.
N. C.	Mooreville	2 p.m., Mar.	28.. Constructing vit. pipe sewer, 10-36 inch.	Town Commissioners.
O.	Sandusky	Mar.	30.. Constructing trunk sewer.	R. Wagar, Engr.
W. Va.	Huntington	Mar.	31.. Supplying vitrified clay pipe.	Board Commissioners.
Ont.	Ottawa	4 p.m., Mar.	31.. Constructing sanitary sewer.	Board of Control.
O.	Salem	noon, Mar.	31.. Sewer construction.	I. N. Russell, Dir. Pub. Serv.
Tenn.	Memphis	noon, Mar.	31.. Extending outlet of 18-inch sewer; purification works; cost, \$18,000.	C. C. Pashby, City Clk.
Neb.	Omaha	Apr.	1.. Extending outlet of 18-inch sewer and sewage disposal works; cost, \$18,000.	E. R. Hune, Clerk.
Neb.	Dundee	Apr.	1.. Constructing outfall sewer.	F. W. Slabaugh, Mayor.
Wyo.	Ft. Yellowstone	11 a.m., Apr.	4.. Constructing sanitary sewers, cost \$25,756.	W. L. McLaurin, Quartermaster
Mo.	Poplar Bluff	7.30 p.m., Apr.	6.. Constructing sanitary sewer.	E. C. Thomas, City Engr.
O.	Marion	noon, Apr.	6.. Construction of lateral sewer.	F. E. Blazer, Clerk.
N. D.	Grand Forks	Apr.	7.. Sewage treatment works.	Council.
O.	Urbana	Apr.	8.. Sewer, 26,700 ft. vitrified pipe; cost, \$43,000.	J. W. Flaughner, Dir. Pub. Ser.
Minn.	New Ulm	5 p.m., Apr.	14.. Constructing main intercepting sewer.	A. J. Meyer, City Clk.
Ind.	Angola	1.30 p.m., Apr.	15.. Constructing sewer system.	R. Hirst, City Clerk.
N. J.	Newark	Apr.	15.. Constructing storm and sanitary sewer system.	Passaic Val. Sew. Comm.
Sask.	Humboldt	Apr.	15.. Constructing storm and sanitary sewer system.	W. H. Stiles, Sec.-Treas.
Ill.	Rankin	Apr.	15.. Constructing storm and sanitary sewer system.	J. W. Shepard, Vil. Clk.
WATER SUPPLY				
O.	Akron	Mar.	23.. Improving water works.	C. P. Parker, Dir. Pub. Serv.
N. Y.	Brooklyn	Mar.	23.. Constructing water mains.	W. Williams, Comr. Water Sup., Gas & Elec.
Cal.	Montague	Mar.	23.. Installing water works system.	Bd. Trustees.
Mich.	Highland Park	Mar.	23.. Furnishing 1,067 tons c. i. pipe, etc.	Village Council.
Pa.	Aspinwall	Mar.	23.. Improving water and light plant.	S. R. Chase, Boro. Clerk.
Pa.	Tarentum	Mar.	24.. Water works supplies; meters, etc.	W. A. Gibson, Sec. Boro. Coun.
N. J.	Woodbury	Mar.	24.. Sinking artesian well and furnishing c. i. pipe and fire hydrants.	A. Starr, City Clerk.
Va.	Richmond	Mar.	24.. 500 tons aluminum sulphate.	E. E. Davis, Sup. W. W.
Cal.	Sacramento	10 a.m., Mar.	24.. Reinforced concrete pumping station.	H. A. Semf, 329 Jay St.
La.	Mansfield	Mar.	24.. Installing water works.	J. W. Parsons, Mayor.
S. D.	Huron	2 p.m., Mar.	26.. Constructing filter.	Commissioners.
Ill.	Westfield	1 p.m., Mar.	26.. 5,400 ft. 6-in. c. i. pipe, specials, hydrants, valves, etc.	Village Board.
La.	Abbeville	3 p.m., Mar.	26.. Installing machinery in water plant.	A. Brasseaux, Mayor.
N. C.	Mooreville	Mar.	27.. Furnishing about 4 miles of c. i. pipe with hydrants, valves, etc.	Town Comrs.
Neb.	Rushville	2 p.m., Mar.	27.. Steel tower and tank.	H. L. Edwards, Clk.
Wis.	Milwaukee	10.30 a.m., Mar.	30.. Boilers for pumping station.	Department Public Works.
O.	Salem	Mar.	31.. Constructing reinforced concrete basin cover.	W. E. Baldry, City Engr.
O.	Junction City	Apr.	1.. Constructing water works, about \$16,000.	H. L. Maddocks, Engr., Newark.
N. J.	Perth Amboy	8.30 p.m., Apr.	1.. Constructing steel water tank, 80 ft. high, 40 ft. diameter.	S. J. Mason, Engr.
Ind.	Crown Point	7.30 p.m., Apr.	6.. Wooden water mains and fittings.	H. W. Barry, City Clerk.
Belgium	Antwerp	Apr.	6.. High Pressure pumps.	Burgomaster.
Alta.	Banff	Apr.	6.. 13,500 lin. ft. 20-in. steel pipe; 12,000 ft. 6-in. c. i. pipe.	L. Periera, Sec. Dept. Interior, Ottawa.
Minn.	New Ulm	5 p.m., Apr.	8.. Laying 4,370 ft. 6-in. water mains.	A. J. Meyer, City Clk.
R. I.	Newport	Apr.	11.. Deepening suction well, screen pit, etc.	H. R. Stanford, Ch. Navy Dept., Washington, D. C.
La.	Muscataine	Apr.	14.. Pumping plant.	Co. Supvrs.
Sask.	Humboldt	8 p.m., Apr.	15.. Water works improvements.	W. A. Stiles, Sec.-Treas.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
LIGHTING AND POWER				
O., Akron	Mar. 23.	Three 150-hp. water tube boilers, and 1 fuel economizer.	C. P. Parker, Dir. Pub. Serv.	
N. J., Pensauken	Mar. 23.	Incandescent lighting for 5 years.	W. E. Wimer, Chm. Twp. Com.	
Ind., Fort Wayne	Noon, Mar. 24.	Delivering and erecting turbo generator set, exciter, condenser, etc.	Bd. Pub. Works.	
N. C., Hickory	Mar. 24.	Purchase of franchise for gas plant.	J. Mitchell, City Mgr.	
Ill., Springfield	10 a.m., Mar. 25.	Furnishing poles for lighting plant.	W. J. Spaulding, Comr. Pub. Prop.	
La., Abbeville	3 p.m., Mar. 26.	Installing machinery in light plant.	A. Brasseaux, Mayor.	
O., Cleveland	noon, Mar. 27.	Induction volted regulators.	A. R. Callo, Comr. Pur. & Sup.	
D. C., Washington	Mar. 28.	Lighting fixtures, armored cable, switch panel, etc.	Maj. F. C. Boggs, Gen. Pur. Off. Isthmian Canal Comm.	
Saks, Regina	Mar. 28.	Furnishing generating or distributing equipment for electrical department	E. W. Bull, Supt. Lt. & Power. Town Commissioners.	
N. C., Wilson	4 p.m., Mar. 31.	Electric power plant and equipment.	Lieut.-Col. F. R. Shunk, U. S. Eng. Off.	
Pa., Pittsburgh	noon, Apr. 1.	Electric light plants, etc.	G. Desery, Engr., Los Angeles.	
Cal., Covina	(about) Apr. 15.	Material for ornamental street lighting system.		
FIRE EQUIPMENT				
Cal., San Jose	5 p.m., Mar. 23.	1 motor propelled fire engine.	R. E. Walter, City Clerk.	
N. J., Glenridge	8 p.m., Mar. 23.	Motor driven hook and ladder truck.	J. A. Brown, City Clk.	
Sask., Moose Jaw	Mar. 25.	1 motor truck, 2 motor combination chemical and hose cars, 1 75-foot aerial truck, 1 motor triple combination and 1 2-wheel tractor.	City Comrs.	
Que., Montreal	Mar. 26.	One pumping engine; one 85-ft. aerial truck; four tractors; two hose wagons and one salvage wagon	J. R. Tremblay, Chief.	
D. C., Washington	Mar. 31.	Fire controlled system	Bur. Sup. & Ac., Navy Dept.	
BRIDGES				
Ind., Newcastle	10 a.m., Mar. 21.	Bridge construction	E. H. Wolfard, Aud.	
Pa., Ebensburg	noon, Mar. 23.	Constructing three reinforced concrete bridges.	Comrs. Cambria County.	
O., Columbus	noon, Mar. 23.	Constructing reinforced concrete arch bridge.	F. M. Sayre, Co. Aud.	
La., Mason City	Mar. 23.	Constructing bridge; cost, \$13,000.	Co. Comrs.	
O., Steubenville	noon, Mar. 24.	22-foot span concrete bridge.	Co. Aud.	
Pa., Evansburg	noon, Mar. 24.	3 reinforced concrete bridges, about 100-ft. span.	Co. Comrs.	
Minn., Warba	10 a.m., Mar. 25.	Constructing bridge	Co. Comrs.	
Neb., Kearney	noon, Mar. 25.	Constructing bridges for 1914.	J. H. Dean, Co. Clk.	
Minn., Winona	2 p.m., Mar. 26.	Constructing 10 concrete culverts; cost, \$32,865.	C. A. Anding, Co. Aud.	
O., Cincinnati	noon, Mar. 27.	Building concrete bridge.	A. Reinhardt, Clerk.	
O., Hamilton	Mar. 30.	Constructing Bridges	Board Commissioners.	
O., Middletown	Mar. 30.	Constructing bridges	W. W. Crawford, Co. Aud.	
Tex., Fort Worth	10 a.m., Mar. 30.	Constructing bridge	Co. Aud.	
Ind., Peru	Apr. 1.	Constructing 120-ft. span bridge; cost, \$8,000.	E. McElhaney, Aud.	
Mich., Lansing	Apr. 1.	Constructing ten highway bridges, 32-150-ft. span.	State Hwy. Comrs.	
N. D., Shafer	4 p.m., Apr. 6.	Furnishing carload, mixed sizes, steel culverts.	O. P. Benson, Co. Aud.	
Minn., Little Falls	2 p.m., Apr. 7.	Building highway bridge, 90-foot span.	R. Y. McNairy, Co. Aud.	
Ind., Winamac	Apr. 7.	18 bridges; cost, \$23,000.	C. E. Paul, Co. Surveyor.	
Neb., Sutherland	Apr. 7.	Constructing bridge	C. W. Yost, Co. Clerk.	
Wyo., Thermopolis	Apr. 7.	Constructing bridge	H. M. Hantz, Clerk Bd. Comrs.	
S. D., Salem	2 p.m., Apr. 7.	Furnishing galv. corrugated metal culverts for the year.	A. E. Ecklein, Co. Aud.	
N. D., Hillsboro	3 p.m., Apr. 8.	Constructing all county bridges for year.	N. O. Lindas, Co. Aud.	
Ore., Gold Beach	5 p.m., Apr. 9.	Reinforced concrete bridge to cost \$35,000.	J. M. Caughell, Co. Sur.	
MISCELLANEOUS				
Ind., Ft. Wayne	10 a.m., Mar. 21.	Furnishing one 10-ton steam roller and one 600-gallon sprinkler	Allen Co. Commissioners.	
O., East Liverpool	noon, Mar. 21.	Motorized police patrol	N. H. Vodrey, Dir. Pub. Serv.	
Ill., Chicago	11 a.m., Mar. 23.	1 steel scow with machinery.	L. E. McGann, Comr. Pub. Ser.	
Ill., Chicago	11 a.m., Mar. 23.	Steel reinforcing rods.	L. E. McGann, Comr. Pub. Ser.	
N. J., Newark	4 p.m., Mar. 23.	Furnishing 12 motorcycles.	J. Bader, Pres.	
Cal., Sacramento	Mar. 24.	Constructing reinforced concrete pumping station.	H. A. Senf, Sec. Trus. Reclam. Dist. No. 1500.	
Ind., Marion	Mar. 25.	One roadster automobile	County Comrs.	
D. C., Washington	10.30 a.m., Mar. 25.	Furnishing vit. sewer pipe, street lamps, valves, gauges, etc.	F. C. Boggs, Gen. Pur. Off.	
Ind., Ft. Wayne	10 a.m., Mar. 26.	Furnishing road roller and tractor.	Co. Comrs.	
O., Cleveland	noon, Mar. 27.	Emergency patrol wagon.	A. R. Callo, Comr. Pur. & Sup.	
Panama, Canal Zone	11 a.m., Mar. 28.	Furnishing four steel towers.	H. R. Stanford, Chf. Bureau Yds. & Docks, Wash., D. C.	
Ill., Urbana	Mar. 30.	Constructing post-office.	Sup. Architect, Treasury Dept., Washington, D. C.	
Ind., South Bend	11 a.m., Apr. 6.	Ten road rollers, and one 20-bbl. sprinkling wagon.	C. Sedgwick, Auditor.	
O., Lorain	noon, Apr. 27.	Constructing subway	L. B. Johnson, Clerk.	
Mo., Richmond	May 1.	Constructing court house; cost, \$100,000.	J. J. Pardue, Co. Treas.	

STREETS AND ROADS

Montgomery, Ala.—Thirteen miles of graveled road in Chilton county, forming important link in Birmingham-Montgomery highway, will be constructed early in spring, according to State Highway Engineer W. S. Keller. About \$12,000 is available for new road.

Opelika, Ala.—The original street paving contracts have been completed and accepted by mayor and city council, and another extension contract has been let. Paving of Avenue A will be extended from Seventh St. to Fifth, and paving on Ninth St. will be extended from Avenue B down Geneva St. to Littleton's store.

Pine Bluff, Ark.—Road bonds in sum of \$66,000 have been sold by Comrs. of Road Improvement, Dist. No. 1, Lincoln County.

St. Johns, Ariz.—Bond issue for constructing highway system is being planned.

Fairfield, Cal.—Supervisors have authorized D. M. Fleming, the Chairman, to submit to State Treasurer bid for \$150,000 worth of state highway bonds. This is first installment of highway bonds

that Supervisors have decided to purchase. In six months bid will be submitted for \$100,000, and in year another bid for \$100,000 will be made, making \$350,000 in all. Money is to be used for building of State Highway from Yolo County line on north to Benicia, distance of 44 miles. First unit of road will probably be built between Fairfield and Benicia.

Los Angeles, Cal.—Proposed purchase by thirty-seven counties in California of \$2,000,000 of state highway bonds for subsequent sale to bond house in order that last one of main trunk highways between San Francisco and San Diego may be completed by 1915, will be considered at conference of supervisors of those counties in Los Angeles on March 14.

Napa, Cal.—At meeting of taxpayers of Napa County, it was unanimously decided that Napa-Shellville and Black Point State Highway should be built whether Supervisors objected or not.

Oakland, Cal.—Board of Supervisors has authorized purchase by Alameda County of another block of 200 state highway bonds, par value \$1,000 each, for \$200,000.

Oroville, Cal.—First National Bank of Chico has purchased \$175,000 worth of state highway bonds.

Oroville, Cal.—Supervisors of Butte County have agreed to take \$475,000 worth of state highway bonds to secure construction of highway through county.

Oroville, Cal.—Supervisors of Butte county, will be asked by commission of ten, comprised of well-known men from over the county, to purchase \$410,000 worth of State Highway bonds.

Red Bluff, Cal.—Three hundred and fifty thousand dollars' worth of State Highway bonds is amount Supervisors agreed to purchase. This sum will construct highway from Shasta line to Glenn line, distance of fifty miles, and making road from Cottonwood to Orland, by way of Red Bluff and Corning. Of this sum, \$125,000 worth of these bonds are to be purchased at once.

Redding, Cal.—Charles F. Stern, member of State Highway Commission, has submitted proposition to Supervisors relative to purchase of highway bonds in this county. Stern stated that if Shasta County will buy \$200,000 worth of state highway bonds Commission will spend \$800,000 in highway construction in

county, county to furnish rights of way and build bridges.

Red Bluff, Cal.—Supervisors of Tehama County have voted to take \$350,000 of state highway bonds to secure construction of state road through county.

San Francisco, Cal.—Construction by state of public road from Saratoga summit into big Redwood forest, at cost of \$70,000, is assured and will be completed by October 1st of this year.

San Francisco, Cal.—That the new pavement for Third St., between Market and King Sts., shall be vitrified brick has been recommended by Board of Public Works, following discussion of several hours on respective merits of brick, asphalt and basalt blocks. Cost of this pavement is estimated by City Engineer at \$85,000.

San Francisco, Cal.—Plans for construction of highways connecting Central and Southern California are being discussed.

Santa Ana, Cal.—Board of Supervisors has instructed County Surveyor McBride to prepare plans and specifications for paving East Chapman Ave., between county good roads corner at McPherson and El Modena.

Sonora, Cal.—County Surveyor E. E. Newell has been ordered to prepare plans and specifications for new county road, 4½ miles long, extending from Stent to county road near Harney ranch, thus making good road direct from Sonora to Big Oak Flat.

Yerka, Cal.—Trustees have adopted plan of City Engineer Harvey Starter for grading Main street, which will be route of state highway through this city, and have ordered that plans and specifications for work be done. Plan is to lay a five-inch asphalt macadam pavement.

Boulder, Colo.—Council has authorized paving of Pearl St. with 7-in. concrete base with surface coating of tar.

Apalachicola, Fla.—Franklin county is authorized by election to issue \$20,000 4½ per cent. twenty-year road bonds. Negotiations are pending for sale.

Brooksville, Fla.—Hernando county will on March 13 offer for sale \$300,000 of road improvement and courthouse bonds.

Crystal Springs, Fla.—Governing Council has decided to recommend that road be built from Central Ave. south on Fifth St., to accommodate numerous settlers in section 1; also to open up road from county road on sectional line between sections 25 and 30 west to tract 47 in section 25.

Green Cove Springs, Fla.—Special road and bridge District No. 1 of Clay county will construct twenty miles hard surface roads; amount available \$120,000.

Lake City, Fla.—Bond trustees, J. W. Lane, secretary, asks bids until March 16 to pave West De Soto St., about 2,600 sq. yds.

Lakeland, Fla.—The city will contract for three miles of cement sidewalk.

Port Tampa City, Fla.—Election is to be called on \$17,000 of bonds for paving, storm sewers and water softening plants.

St. Augustine, Fla.—Election will be held April 1 on \$650,000 of St. John's county brick road bonds.

Tavares, Fla.—It is expected to shortly sell \$500,000 of good roads bonds of Lake county.

Athens, Ga.—Large amount of concrete pavement will be constructed this year. J. H. Barrett is City Engr.

Springfield, Ill.—By vote of 26 to 15 Sangamon County Board of Supervisors have voted \$37,000 to be expended on road construction during coming summer. This amount will be spent under direction of state highway commission, and under provisions of Tice act state will contribute like amount to work.

Fort Wayne, Ind.—Board of Works has adopted resolutions for 27 sidewalk improvements.

Fort Wayne, Ind.—In election residents of Springfield township decided to bond township for building of fourteen miles of stone road. Five roads are included in proposed system. On March 16 there will be election in Marion township, at which time voters will decide on question of bonding that township for roads. It is proposed to bond township for four roads there.

Frankfort, Ind.—Preliminary resolution has been adopted by Common Council to improve Armstrong St., from Fifth to East St. distance of about 0.76 of mile. Estimated cost, \$57,000, and consists of 14,500 sq. yds. roadway, together with cement curbs and sidewalks and 0.65 of mile of storm sewer. Work will be ready for bidders about middle of April. R. H. Roynon is City Engineer.

Indianapolis, Ind.—Plans and resolutions for paving of following streets

have been ordered by the board of public works: Clifton st., from 36th St. to Roache Ave.; Dickson St., from Ohio to Market St.; Oriental St., from Washington St. to Storm Ave., and Park Ave., and Ruckle St., from 38th to 42d Sts.

Terre Haute, Ind.—J. F. Wild & Co., Indianapolis, has bought \$53,000 in 4½ per cent. bonds issued for township road.

Shelbyville, Ky.—The Fiscal Court has voted to set aside \$30,000 out of county levy for maintenance of 385 miles of macadamized roads in county.

Versailles, Ky.—At meeting of City Council it was decided to pave Main St. in business center with asphalt for distance of two blocks.

Deer River, Minn.—County board has called for bids for making of 40 miles of highway to run from Deer River to north county line.

Duluth, Minn.—An attempt will be made to raise \$20,000, amount said to be required above amount which property owners will pay for paving of 3d St., from Vernon to 54th Aves.

Saginaw, Mich.—Re-paving of Franklin St., Genesee to Tuscola, with asphalt is recommended.

Eveleth, Minn.—Construction of road from city to township line, distance of six miles, is being discussed.

Liberty, Mo.—Paving of Missouri St. and Morse Ave. with concrete, in two contracts, at cost of about \$33,000, is under consideration. E. H. Carter is City Engr.

Billings, Mont.—Advertising for bids for two paving districts on North Twenty-seventh St. will be authorized by city council.

Amherst, N. H.—Citizens have voted \$3,000 appropriation for state highway aid.

Concord, N. H.—A road convention will be held here March 19-20. The requirements of exhibitors has exceeded the space and new quarters have been secured.

Nashua, N. H.—Resolution has been passed appropriating money for building of Milford highway.

Camden, N. J.—Finance Committee of Board of Freeholders has opened bids for purchase of \$65,000 worth of road improvement bonds.

Passaic, N. J.—Bids will probably be advertised for asphalt improvements proposed for east side of Main Ave., Brinkerhoff pl, Morris, Hudson and Mercer Sts.

Paterson, N. J.—Ordinance has been adopted for grading, curbing and guttering of various streets.

Brooklyn, N. Y.—Following are repaving appropriations for this year made by Board of Estimate: Brooklyn will be voted \$650,000; Manhattan will get \$1,000,000 the Bronx \$110,000 and Richmond \$150,000. Bueens is to be left out altogether, because President Connolly did not expend \$370,000 of his last year's appropriation.

Greenwich, N. Y.—Under resolution passed by Town of Greenwich for bond issue for road improvements, town will expend \$100,000 this year in new roads. This does not include what will be spent also in repairs and upkeep of old roads, which will amount in addition to probably about \$70,000. New roads are to be of concrete construction and will be built in main thoroughfares.

Ogdensburg, N. Y.—To improve highways of town of Oswegatchie Town Board has apportioned highway money for following roads: One mile on road from J. Lerue's corner towards village of Heuvelton; macadam. Three-fifths mile on Rensselaer Falls road leading to Canton town line; macadam. One-half mile on road Heuvelton to Dekalb town line; macadam. One mile on road from Lang's corner to the Adam farm; macadam. One-half mile, Russell's corner towards A. Doran's property; macadam. Repairs will be made on Heuvelton, Lake, Mount Alone, east, and Down roads. The highway to the proposed Oswegatchie-Depeyster bridge will be filled and graded. Forty concrete sluices will be constructed. Reserve fund is \$4,140.87.

Oswego, N. Y.—Board of Supervisors has repassed highway bond issue of \$60,000.

Warsaw, N. Y.—Bids for bond issue of \$22,000 for extra paving in Main St., this village, in connection with Warsaw-Gainesville state road, have been opened. Bonds were awarded to Trust Co. of Wyoming county.

Mount Airy, N. C.—City authorities are making extensive preparations for street improvements this spring. Order has been placed for a 10-ton roller, a concrete mixer and 16,000 gallons of tarvia to begin the work with about April 1.

Cleveland, O.—Street improvement bonds in sum of \$1,050,000 have been sold by city.

Coshocton, O.—A. W. Shaw, resident engineer, with corps of assistants, has begun surveying route for new paved brick road, which is to run south of city. It will take place of former "river road." As soon as this survey is completed Engineer Shaw will begin survey of other four roads, which state is aiding in constructing.

Hamilton, O.—Meeting of township trustees and road superintendents of Butler County will be held at the Court House, 10 A. M., March 19.

Mansfield, O.—Resolutions have been adopted for improvement of various streets.

Youngstown, O.—Resolutions have been adopted for paving of various streets.

Youngstown, O.—Ordinances have been adopted for improvement of various streets.

Carlton, Ore.—City Council has taken first steps towards paving streets throughout business section of city. Bids for work will be called for about middle of April.

Portland, Ore.—Proposals for construction of hard-surface pavement on Base Line road from city limits to hill west of Sandy River, have been called for by County Commissioners, and will be considered as soon as presented.

Dunsmo, Pa.—Ordinance has been passed providing for bond issue for paving and sewer work.

Lebanon, Pa.—Ordinances providing for paving of Eighth St., from south line of Chestnut St. to P. & R. Railroad, and Cumberland St., from Fifth to Ninth, have been passed finally.

Pittsburgh, Pa.—Department of public works has filed ordinance for opening of Hamilton Ave., from 5th Ave. to Lambert St., in East Liberty district. Improvement will give outlet for traffic eastward and will cost about \$200,000.

Wyomissing, Pa.—Twenty thousand dollars has been appropriated for general permanent improvement of streets of borough of Wyomissing.

Woonsocket, R. I.—New highway is planned from Sayles to Fairmount St.

Woonsocket, R. I.—Sum of \$1,800 will be appropriated for purchasing oiling apparatus.

Woonsocket, R. I.—Appropriation of \$23,500 will be made for macadamizing with trap rock and asphalt surface Harris Ave.

Woonsocket, R. I.—Appropriation of \$23,500 has been made for macadamizing Harris Ave. and Cumberland Hill Rd.

Woonsocket, R. I.—It has been resolved that following sums of money, or so much thereof as may be necessary, be appropriated for construction work in highway department: Lyman St., macadamizing from Harris Ave. to Oakley Rd. with trap rock and asphalt surface, \$784; Glen Rd., macadamizing from Spring St. to Upland Rd. with trap rock and asphalt surface, \$4,400; Cottage St., macadamizing from Bernon St. to Crawford St., \$2,800; Page St., grading and curbing from Clinton St. to Socal St., \$1,150; Dewey St., grading from Diamond Hill Rd. to Estes St., \$330; Fairmount St., macadamizing and curbing from River St. to bridge, \$3,200; Welles St., macadamizing from Hamlet Ave. to Paradis Ave., \$4,200; Highland St., grading from Harris Ave. to Angle in said street, \$250; Transit St., grading and paving gutter from Thomas St. to Park Ave., \$300; Bernon St., grading from Grove St. to Bennett St., \$2,500; Elm St., grading, building walls and extending culverts from Dulude Ave. to Cass Ave., \$2,000; Meadow Rd., grading and building good gravel road, \$2,800; total, \$24,794. Above appropriations are to be expended under direction of Highway Commissioner.

Greenville, S. C.—Council has voted to pave north side of West Washington St., from Laurens to Academy, with cement, and from Academy to Mulberry with tiling.

Sioux Falls, S. D.—City Commission is planning to pave 21st St.

Sumter, S. C.—At meeting of county board \$10,000 of road improvement bonds were sold to Providence Savings and Trust Co., of Cincinnati, Ohio.

Yankton, S. D.—Paving of Third St. is being planned.

Greenville, Tenn.—Commissioners appointed by county court for this purpose have negotiated sale of two hundred thousand additional of county bonds, issued for road purposes. This aggregates \$600,000 in bonds issued by this county for road purposes and \$100,000 additional is authorized by vote of county.

Knoxville, Tenn.—Acting under instructions, J. Boyd McCalla, city engineer, is now preparing plans and specifications for repaving of Gay St.

Nashville, Tenn.—On bid of \$711,888.50 and accrued interest for purchase of \$695,000 of serial bonds of city of Nashville for street improvements Board of City Commissioners has awarded securities to Estabrook & Co., bankers, of New York.

Austin, Tex.—Preliminary arrangements for paving of West 8th St., from Congress Ave. to Colorado St., have been taken up at regular meeting of Council.

Bryan, Tex.—Early in April election has been called for further issuance of \$12,000 in bonds to pave side streets intersecting Main St. for block each way.

Fort Worth, Tex.—County Engineer is preparing plans for building of road between Fort Worth and Mineral Wells.

Galveston, Tex.—It is intention of Commissioner Sappington to ask for appropriation of \$175,000 for street paving in city this year. With this much paid by city total amount of paving will amount to approximately \$375,000.

Holland, Tex.—An election has been held in Precinct No. 2 of Bell County to vote on issuance of \$105,000 road bonds. Returns for the precinct show 478 votes for bonds and 102 votes against. Roads to be built will radiate out of Holland.

Houston, Tex.—Pavement of old Richmond road for four miles beyond end of present paving has been recommended.

Houston, Tex.—Bids will be asked by County for following new roads: Navigation Boulevard, city to Turning Basin, to be paved with shell 14 ft. wide; Clinton road to Clinton, 14-ft. gravel, delivery at Clinton; Webster and Friendswood road, 4 miles, 10-ft. shell, delivery at Webster; Alameda road, 6 miles, 12-ft. gravel, delivery at Columbia Tap; 28th St. to Arlington, Arlington 25th St. to Houston Ave. extension, Arlington to 23d St., gravel, delivery at Houston Heights; Houston and Crosby road from Crosby to the Liberty County line, gravel, delivery at Crosby and Waller; Crosby-Huffman road, Cedar Bayou and Mount Bellevue, 12-ft. shell, delivery on boats at the head of navigation at Cedar Bayou; Houston and Katy road, 12-ft. gravel, delivery at Katy; Washington road to Waller County line, 14-ft. gravel; delivery on the Houston and Katy road at Addicks, Barker and Burnap; East Montgomery road to the county line and into Spring and Westfield, for road from East Montgomery road into Westfield, with shell.

Houston, Tex.—Bids have been ordered advertised for construction of various roads.

Houston, Tex.—Specifications have been adopted for construction of combined concrete curbs and gutters on following streets: Colorado, from Washington to Lubbock; Henderson, from Washington to Lubbock; Johnson, from Washington to Center; Tenth, from Washington to Preston.

Houston, Tex.—Specifications have been adopted for paving of following streets in Fourth Ward: Wilson, from Andrews to San Felipe; Andrews, from Heiner to Wilson; Heiner, from Robin to Andrews; Robin, from Smith to Heiner; Polk Ave., from Milam to Smith. On all of the above mentioned streets in the Fourth Ward, except Wilson, from Andrews to San Felipe, the specifications call for three-inch wood block, standard brick and vertical fibre brick asphalt. Specifications for Wilson, from Andrews to San Felipe, call for 3-inch wood block only.

Marshall, Tex.—Citizens have authorized \$300,000 bond issue for road improvements.

Rockwall, Tex.—Rockwall Commissioners' Precinct will vote on proposition of issuing \$200,000 road bonds for purpose of building gravel roads.

Snyder, Tex.—Commissioner's court has ordered a road bond election for April 11 to authorize \$50,000 in 5 per cent. bonds for road and bridge purposes.

Temple, Tex.—E. A. Kingsley, City National Bank Bldg., has been chosen as engineer to supervise construction of roads near city, to cost about \$600,000.

Terrell, Tex.—Commissioners' Court, in session at Kaufman, has ordered road bond elections to be held in Kaufman Precinct No. 1 for \$200,000, and in Crandall Justice Precinct No. 8 for \$150,000, to be held on April 16. It is planned to hold another road bond election in Terrell and Elmo precincts as soon as required petitions can be presented to Commissioners' Court, covering same territory embraced in recent road bond election held in this district.

Ogden, Utah.—Resolution has been adopted providing for paving of 25th

St. west of Washington Ave. and Wall Ave. between 24th and 25th Sts.

Salt Lake City, Utah.—By unanimous vote city commission decided to pave State st., from 10th South to 11th South with asphalt.

Blacksburg, Va.—March 17, taxpayers in Blacksburg magisterial district will vote on question of issue of bonds to amount of \$100,000 for improvement of roads in district.

Bridgeport, W. Va.—County commissioners at their meeting, held at St. Clairsville, authorized bond issue of \$450,000 for purpose of paving old National road through Belmont county. Balance of money necessary, \$180,000, will be supplied by state. Bonds will be sold April 7th.

Niagara Falls, Ont., Can.—Provisions for extension of boulevard from Bridgeburg to Fort Erie will be made in appropriation estimates for this year.

CONTRACTS AWARDED.

Connecticut.—By State Highway Comr. Hartford, for construction of roads, as follows: New Haven, 5,630 sq. yds. of asphalt pavement over 6-in. concrete base on State St., to Union Paving Co., Schenectady, N. Y., at approximately \$12,329.70; Clinton, section of macadam road on Beach Park Road, to Frank Arrigoni & Bro., Middletown, for \$6,680; Orange, section of gravel road on highway leading from Milford Turnpike to the Orange Turnpike, to Robert G. Miller Contr. Co., of Hartford, for approximately \$15,215.

Leesburg, Fla.—To W. A. McNally of Gainesville, contract to construct 10,000 yds. of granolithic sidewalks, at about \$10,000.

St. Augustine, Fla.—For surfacing with brick 64 miles on John Anderson Highway, county road from King and Lewis Park Aves. to Putnam County line, and county road from Hastings to Volusia County line, to Wilson Constr. Co. of Jacksonville, at \$527,155.

Tampa, Fla.—A \$125,000 paving contract in Hillsboro county, Florida, has just been awarded to the R. M. Hudson Co. of Atlanta. The contract is for smooth pavement in and around the city of Tampa.

Tampa, Fla.—By Hillsboro County Commissioners, contract, at \$42,555.59, to Edwards Const. Co., Tampa, for paving Riverview Rd., Harney Rd., Nebraska Ave. and West Coast Rd.

Alton, Ill.—Bids for five different city paving jobs have been opened in office of city engineer. Contracts in five city paving jobs were awarded to C. H. Degenhardt, Liberty St.; H. R. Wolf, Logan St.; H. R. Wolf, 7th St.; E. E. Rutledge & Co., alley in Lea's sub-division, and E. E. Rutledge & Co., Mechanic St. Bids are as follows: C. H. Degenhardt—Liberty St., brick, \$1.87½; curb and gutter, 60c.; Mechanic St., brick, \$1.60; 7th St., brick, \$1.60; curb and gutter, 53c.; alley in Lea's sub-division, brick, \$1.65; wooden curb and gutter, 20c.; Logan St., brick, \$1.61½; curb and gutter, 53c. Nixon & Morfoot—Mechanic St., brick, \$1.55; 7th St., brick, \$1.55; curb and gutter, 50c.; Logan St., brick, \$1.57½; curb and gutter, 52c. H. R. Wolf—Logan St., brick, \$1.57; curb and gutter, 46c.; Liberty St., brick, \$2; curb and gutter, 50c.; 7th St., brick, \$1.53; curb and gutter, 45c.; Mechanic St., brick, \$1.53; alley in Lea's sub-division, brick, \$1.63; curb and gutter, 22c. Robert Curdie—Logan St., brick, \$1.61; 7th St., brick, \$1.59; curb and gutter, 49c.; Mechanic St., brick, \$1.61. E. E. Rutledge & Co.—7th St., brick, \$1.50; curb and gutter, 55c.; Mechanic St., brick, \$1.50; Logan St., brick, \$1.54; curb and gutter, 55c.; alley in Lea's sub-division, brick, \$1.62; curb and gutter, 20c. John Klasner—Mechanic St., brick, \$1.60. E. A. Burke—Mechanic St., \$1.60; Logan St., brick, \$1.60; curb and gutter, 50c. Brooker & Grabbe—Logan St., brick, \$1.66; curb and gutter, 53c. H. H. Beiser Co.—7th St., brick, \$1.57; curb and gutter, 50c.; Mechanic St., brick, \$1.57. Stafford & Miller—Logan St., brick, \$1.61; curb and gutter, 50c.; Liberty St., brick, \$2.10; curb and gutter, 50c.

Moline, Ill.—For brick pavement in 9 contracts, to Dunning & Masters of Shenandoah, Ia., at total of \$183,107. Itemized bids includes following: 15,600 cu. yds. excav., 40 cts.; 42 60-in. intake basins, each \$25; seven 90-in., each \$35; 3 manholes, \$20; 19,328 ft. granite concrete curb, 47 cts.; 772 ft. steel protected concrete curb, 67 cts.; 28,650 sq. yds. 5-in. concrete foundation, 65 cts.; 28,650 sq. yds. brick block pavement, \$1.46½; 900 ft. 10-in. sewer pipe in place, 40 cts.; 1,900 ft. 12-in., 45 cts.; 330 ft. 15-in., 60 cts.; 18 ft. 18-in., 85 cts.;

710 ft. 30-in., \$2; 440 ft. 36-in., \$3. Lyle Payton is City Engr.

Baltimore, Md.—Patrick Flanigan & Sons of Baltimore apparently was lowest bidder before Board of Awards for repaving with sheet asphalt and vitrified brick Charles St., from Chase St. to North Ave. This firm offered to do work in connection with other streets under same contract for \$1.84 a sq. yd. Contract calls for repaving of Eager and Howard Sts., between Park Ave. and Cathedral St., and Park Ave., from Richmond St. to Lanvale St. Other contractors bidding for this work and their prices for sheet asphalt are as follows: American Paving & Construction Co., \$1.87 a sq. yd.; the Warner-Quinlan Co., \$1.87; the Baltimore Asphalt Block & Tile Co., \$1.90. Bids were referred to Paving Commission for tabulation and report. Board also opened bids for contract No. 84 under Paving Commission's specification, calling for repaving with vitrified brick Alsquith St., between Baltimore and Lexington Sts., and Park Ave., between Lexington and Centre Sts. At bid of \$2.21 a sq. yd. for this work, P. F. Reddington & Son seems to be lowest bidder. For this job George Long Contracting Co. bid \$2.24 a sq. yd. and Standard Contracting Co., \$2.30. These bids were also referred to Commission for tabulation and report.

Camden, N. J.—On recommendation of A. L. Sayers, street commissioner, street committee has awarded contract to Warner-Quinlan Asphalt Co. for furnishing asphalt to city of Camden from April 1, 1914, to April 1, 1915, subject to tests by street commissioner. Bids were as follows, f. o. b. Camden Asphalt Plant: The Warner-Quinlan Asphalt Co., Montezuma asphalt, \$15.45 per ton; Standard Oil Co., Standard paving asphalt, \$15.75 per ton; Barber Asphalt Paving Co., Trinidad Lake asphalt, \$19.70 per ton; Texas Co., Texaco paving cement, \$19.10 per ton; United States Asphalt Refining Co., Aztec brand, \$16.85 per ton; John Baker, Jr., star brand California refined asphalt, \$16.75 per ton. Each company was permitted to submit their own analysis as their specifications.

Decatur, Ind.—By County Comrs. for macadamizing roads as follows: Bryan Road, to Buckmaster & Feters, Geneva, \$7,158; Mooser, to Harry Meshberger, Linn Grove, \$5,600; Reusser and Watson Roads, to L. O. Bears, Geneva, \$11,775 and \$1,754; Frank and Lengerish Roads, to L. W. Frank, Decatur, at \$1,984 and \$3,947; Fugate and Johnson Roads, to Merryman & Fugate, of Monroe, at \$3,783 and \$2,748; South Bern Road, to D. & F. Striker, of Berne, \$4,890; Doehrmann Road, to Christ Musser, of Bingen, at \$9,565. T. H. Baltzell is Co. Auditor.

Fort Wayne, Ind.—Contract for stonewalling 31,454 ft. of Tonkel and Warner Rds., between Perry and Cedar Creek townships, has been let to F. H. Fuelling on bid of \$43,323.20. Engineer's estimate on road was \$45,255.10.

Goshen, Ind.—For construction of ¼ mile of concrete pavement on Elkhart, Mishawaka Road, by County Comrs., to Northern Constr. Co. of Elkhart, at \$5,966.

Newport, Ind.—For construction of gravel road in Geneva township to Faulks Contracting Co., Tere Haute, Ind., at \$12,465.

Vernon, Ind.—For construction of road in Geneva township to Wilkerson & Waltermier, Scipio, at \$5,750. Other bidders were: William Hulse, \$5,775, and William Avery, \$5,860.

Lake Charles, La.—Contracts for more than \$270,000 in road and bridge work on Highways Nos 1 and 2 of new highway system have been let by Police Jury of Calcasieu Parish. Contract for 20 miles No. 1 3-in. vitrified vertical fiber brick. Seven miles of Highway No. 1 will be 8 ft. 2 ins. wide, plus 5 ins. concrete curb on each side; cement ground filler; 4-in. concrete base. Highway No. 2, 13 miles, may have concrete base. Contract for all work on Highway No. 1, between here and parish line, goes to Percy A. Hipple. Road work will cost \$101,980.20, of which more than half is for brick. Bridge work amounts to \$10,637. Contract for road work on Highway No. 2 was awarded to Healy Const. Co. Brick work comes to \$118,787.10, and gravel roads to \$32,361.54, totaling \$151,148.64.

Independence, Mo.—For improving road from Greenwood east to Spiteaufsky & Gedeusky, Kansas City, Mo., at \$11,600. Other bidders were: Ransome & Cook, \$12,700; Davidson Construction Co., \$12,800; Rass Co., \$16,100, and J. J. O'Connor, \$12,750.

Atlantic City, N. J.—For widening up-town Boardwalk, from Maryland Ave. to

New Hampshire Ave., from 40 to 60 ft., by City Comm., to Wilbert Beaumont, of Atlantic City, at \$16,487.

Albany, N. Y.—The Spellman Oliver Co. of Chateaugay was low bidder on Adams-Tremaine Corners Rd., distance 7.4 miles. Burns Bros. & Haley and Semper Bros. of Watertown were bidders.

Albany, N. Y.—State Commission has awarded contracts for construction of public highways, for which bids were opened on March 6, to lowest bidders, except for Road No. 5361, Briarcliff Manor Village, 0.83 miles, which was awarded to Bridgeport Construction Co., Poughkeepsie, N. Y., at \$22,661. (See lowest bidders March 12 issue).

Brooklyn, N. Y.—To Charles A. Myers Contracting Co., Inc., Brooklyn, at \$76,730, for repaving Myrtle Ave. Other bidders were: Henry E. Kordes, \$90,265; Empire Construction Co., \$79,766; J. J. Guinan Contracting Co., \$86,164; F. J. Gallagher, \$83,539; Joseph Rosenthal, \$83,314; Newman & Carey Co., \$80,633; Eastern Contracting Co., \$81,047; M. J. O'Hara, \$85,143; and Norton M. Gorman Contracting Co., \$82,641. For repaving Knickerbocker Ave., contract was awarded to Charles A. Myers Contracting Co., Inc., Brooklyn, at \$37,940. Other bidders were: Norton & Gorman Contracting Co., \$40,919; Henry E. Kordes, \$44,409; Empire Construction Co., \$38,984; J. J. Guinan Contracting Co., \$42,595; F. J. Gallagher, \$40,292; O'Grady Bros., \$39,751; Joseph Rosenthal, \$41,249; M. F. Moran, \$42,038; Newman & Carey Co., \$39,364; Eastern Contracting Co., \$42,277; and M. J. O'Hara, \$42,060.

Columbia Station, O.—For macadamizing about 10 miles of road in Columbia Township, to Kennedy Warner Co., Medina, at \$45,809.

Findlay, O.—By Commissioners of Hancock County, contracts for 15 miles of road as follows: Treece Road, to Claude Dutton, Bowling Green, at \$16,800; Essinger Road, to A. W. McNeal & Son, Findlay, \$8,000, and the Eagle Center Road, at \$8,085; South Ridge Road, to C. D. Finch, Bowling Green, at \$15,000; Pepple Road, to C. T. Biggs, Findlay, at \$5,000.

Connellsville, Pa.—For construction of mile of Albany Hill Road, to F. J. Foye, at \$20,446, brick to be furnished by United Fire Brick Co., of Dunbar, at \$19.90 per M.

Philadelphia, Pa.—To Union Paving Co., 30th and Locust Sts., Philadelphia, for repaving and patching asphalt streets, at \$3.90 per ton for binder, and \$8.84 per ton for wearing surface. Total contract, \$250,000. Wm. H. Connell is Ch. Bureau of Highways.

Scranton, Pa.—For extending Luzerne St. culvert in 5th and 21st Wards: 80 lin. ft. reinforced concrete culvert, size 15 ft. by 7 ft. 6 in. to Bown Contracting Co., at \$1,733.58 for complete work.

Newport, R. I.—For granite curb and paving blocks, contract was awarded to Hooper, Hovey & Co. at following bid: Straight granite curb, 55 cts. a foot; circular curb, 80 cts. a foot; granite curbs (paving blocks), \$37 per 1,000 blocks.

Knoxville, Tenn.—Number of contracts for road work have been awarded by Knox county road commissioners. T. J. Hutton received the contract for construction of \$1,800 worth of road work on Brown's Gap Rd. J. C. A. Burnett & Co. received contract for construction of Middlebrook pike repair work at \$700. Lawson Irving was awarded contract for \$1,800 worth of grading on Byington and Cox bridge road. Fitzgerald & Crippin were awarded contract for grading Marion St. road.

Fort Worth, Tex.—F. B. Briggs has been awarded contract by county commissioners for graveling 400 yards of Oak Grove Rd. at \$296, his being lowest bid. G. B. Coke was awarded contract for graveling one mile of Nine Mile Rd. near Young's store at \$536. Contract for grading Nine Mile Rd. was awarded G. B. Coke at \$360.

El Paso, Tex.—Steps have been adopted by City Council for paving of more city streets. Bid of Southwestern Paving Co., amounting to \$1.20 per sq. yd. of paving, for paving North Florence from Hill to Missouri, was accepted. Contract and bond of same company, amounting to \$1,432 for paving Arizona St., from Golden Hill terrace to Hutton St., was also approved.

Port Arthur, Tex.—Contract for walks and curbs about new DeQueen school have been let by board of directors of new school. Knapp & Zimmerman received contract to do the work.

Waco, Tex.—For constructing one mile 30 ft. wide of River Driveway, with

limestone and gravel macadam, to T. E. Luttgerding of Waco, at \$11,286.

Racine, Wis.—Board of public works has awarded three paving contracts, aggregating in value nearly \$90,000, to local contractors. Contracts were: Paving Superior St., Hamilton to High St., about \$20,000; paving North Wisconsin St., Dodge to Gould St., about \$43,000; Paving Washington Ave. to West Blvd., about \$25,000. Following are successful contractors and their bids: James Cape & Sons, paving Superior St. with either Barr or Danville brick, at \$1.99 for either paving per sq. yd.; 60 cts. for curb and gutter, or 30 cts. for gutter alone; Birdsall-Griffith Const. Co., paving N. Wisconsin St., Dodge to Gould St., with Danville or Barr brick, at \$1.99 for either; 60 cts. for curb and gutter, or 30 cts. for gutter alone; Western Improvement Co., paving Washington Ave., Asylum to West Blvd., with no specified kind of brick, at \$1.49 per sq. yd. paving.

Chehams, Wash.—For surfacing Dryad-Ceres road to G. Korevaar, at \$2,845.

Olympia, Wash.—Final action toward building passable highway through Snoqualmie Pass after twenty years or more of controversy, has been taken by state highway board when contract for remaining portion of work, 24 miles, was let to P. J. McHugh, of Seattle, for \$203,696.

Seattle, Wash.—Proposals on contract for grading and resurfacing West 65th St. et al will be returned to Board of Public Works with recommendation by City Engineer that contract be awarded to low bidder, D. H. Traphagen of Seattle on bid of \$15,108.80.

Spokane, Wash.—For paving of Superior St., to Spokane Bitu-Mass Paving Co., at about \$8,000.

SEWERAGE

Milton, Fla.—City will extend sewers; about 3½ to 4 miles sanitary sewers.

New Smyrna, Fla.—City will install sewer and water system; engineer estimates cost at about \$100,000.

Port Tampa, Fla.—City will vote on \$17,000 bonds for improvements to include storm sewer system, street paving and plant for softening and purifying water.

Augusta, Ga.—Mr. Nisbet Wingfield, commissioner of public works, is now engaged in preparing specifications to govern work of changing course of sewers that empty into river at Fourteenth, Eleventh, Eighth and Second Sts., and will shortly ask for bids on the contract. This work comes under head of flood protection plan, and will be financed out of funds provided for that purpose. Mr. Wingfield estimates that work when completed will represent expenditure of approximately \$100,000.

E. St. Louis, Ill.—Bids will be advertised for building of sewer on Illinois Ave., from 16th to 21st Sts.

Fort Wayne, Ind.—Board of public works will in all probability ask council to appropriate sum of \$10,000 at its next meeting, money to be used in cleaning nearly 100 miles of sewers completely or partially filled with sand and refuse. One of first expenditures from this fund will be for purchase of cleaning device.

Burlington, Ia.—Resolution has been passed for construction of combination storm water and sanitary sewer to be known as "Prospect Hill" sewer. R. Kroppach is City Clerk.

Burlington, Ia.—Resolution has been adopted to construct combination storm water and sanitary sewer of vitrified sewer pipe as follows: In Main St., from the present sewer at the intersection of South and Main St., to the first alley south of South St., of 12-in. pipe; in Main St., from first alley south of South St. to Polk St., of 10-in. pipe; from Polk St. to alley south, of 8-in. pipe; alley south of Polk, from Min St. to the east end, of 8-in. pipe. Said sewer to be located east of the curb on Main St., with necessary catch basins, trap holes, etc. Plans and specifications for sewer in Rands' Trust-tee addition, sub-division, a part of Highland addition and neighboring property has also been adopted.

Fort Scott, Kan.—Ordinance has been adopted providing for calling of special election to vote bonds for construction of sewage disposal plant.

Hutchinson, Kan.—Sewer system will be installed.

Paducah, Ky.—A consulting engineer to assist City Engineer L. A. Washington in preparing exhaustive plans and specifications for proposed Third District sewer will be employed by city.

Lake Charles, La.—Plans are being made for improving drainage of city.

Annapolis, Md.—Senator Maloy has offered in Senate a bill authorizing submission to people of Baltimore of loan of \$3,000,000 for completion of sewerage system.

Ft. Benton, Mont.—Plans are being prepared by O. E. Jaqueth of Kalispell for sewer system to empty into river, to cost \$33,000. John F. Murphy is City Clk.

Elizabeth, N. J.—Ordinance has been passed to provide for construction of lateral or connecting sewer in Blancke St., from Carnegie St. south about 400 ft. to Lincoln St., and to discharge into the Roselle trunk sewer at Carnegie St.

Hoboken, N. J.—Over 8,000 signatures are attached to petition requesting immediate construction of sewer in northwest section of Hoboken, to be submitted by Hoboken Board of Trade to Common Council. Board of Trade will advise installation of two main outlet sewers to drain upper section of city, one outlet to be at Eleventh St. and other at Fifteenth St., both emptying into Hudson.

Paterson, N. J.—Ordinance has been adopted for construction of sewers in various streets.

Plainfield, N. J.—Plans are being considered for enlarging present sewer bids.

Buffalo, N. Y.—Sewer Com. of Bd. of Aldermen are in favor of constructing a 9-ft. trunk sewer in Hertel Ave. and Tonawanda St., to cost about \$90,000.

Dunkirk, N. Y.—Council has declared its intention to construct 8-in. sewer in and along Doughty St., from Hoyt St. to Lord St., to be built in accordance with plans and specifications of City Engineer. City Clerk has been empowered and directed to advertise once a week.

Fredonia, N. Y.—Fred K. Wing of Buffalo has prepared plans for new sewer system and sewage disposal plant. Estimated cost, \$100,000.

Oswego, N. Y.—Taxpayers of Oswego will be called upon to approve special bond issue of \$110,000 on March 25 for completing of city's improved sewer system.

Rochester, N. Y.—Estimated cost of sewage disposal plant to be built in Irondequoit on which bids will be received is \$400,000, and it is expected that large number of building contractors from outside the city will submit bids. Plans and specifications call for excavation of 110,000 cu. yds. of earth, 70,000 cu. yds. of embankment construction and 25,500 cu. yds. of concrete construction besides 850 tons of steel reinforcement. Contract for construction of screens for settling tanks is not included and this work will be advertised separately. There will also be separate contract for building of power plant.

Schenectady, N. Y.—A \$300,000 bond issue for sewer construction work is to be recommended by Comptroller James F. Hooker to meet requirements of department of public works.

Syracuse, N. Y.—Construction of trunk sewer east of Westcott St. is favored.

Walden, N. Y.—Better sewers are being planned by Village Board.

Concord, N. C.—First installment of Cold Water Creek drainage bonds has been disposed of to Cabarrus Savings Bank of this city. Total issue is \$13,000 and bank has purchased \$6,000.

Akron, O.—Sewage disposal plant plans are being prepared.

Hamilton, O.—Councilman Baker has reported to East End Improvement Association that storm sewer system would cost \$30,000. Bonds must be sold before work can be started. He also reported that no bids for sanitary sewer system have been received.

Mansfield, O.—Council has voted to issue sewer bonds in amount of \$5,000 for Fifth and Main Sts., and \$5,800 for sewer along Surrey road.

Mansfield, O.—Ordinance has been passed providing for issue of bonds of City of Mansfield, O., for purpose of constructing storm water sewer on Fifth St., from Diamond St. to Franklin Ave., and on Main St., from Fifth St. to Sixth St.; also on Surrey Road, from Rocky Fork of the Mohican to Newman St., on Spring St., from Newman St. to Wayne St.; on Wayne St., from Spring St. to Grace St.

Springfield, O.—City Council has accepted report of finance committee on sale of \$54,500 worth of bonds to Hayden-Miller Co., of Cleveland. Of this issue \$48,000 is for sanitary sewer disposal plant and \$6,500 for new pump at water works station.

Youngstown, O.—Legislation was started for construction of two of half dozen big district sewers required to